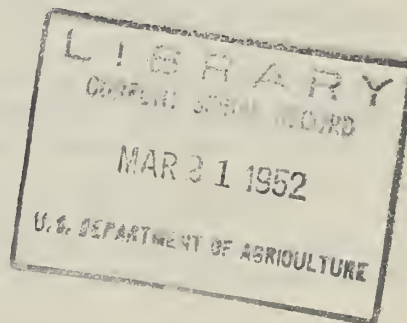


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ABSTRACTS *of* RECENT PUBLISHED MATERIAL on *Soil and Water Conservation*



UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ABSTRACTS OF RECENT PUBLISHED MATERIAL
ON SOIL AND WATER CONSERVATION

Prepared by J. H. Stallings, Research Specialist,
Soil Conservation Service

This is the SIXTH of the publications issued under this title. These publications are issued at irregular intervals, depending on the amount of material published.

Their purpose is to bring together a summary of current information about soil and water conservation for ready reference of those actively engaged in soil conservation work. Distribution is confined to technical personnel of the Soil Conservation Service and cooperating agencies and to such other scientists or conservation workers as specifically request it.

The active cooperation of Soil Conservation Service personnel and others who write conservation material is needed if these publications are to serve their intended purpose adequately. Such cooperation can best be rendered by supplying an abstract, reprint, or copy of the material as soon as it is published to J. H. Stallings, Soil Conservation Service, U. S. Department of Agriculture, Washington 25, D. C.

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HOW SERIOUS IS SOIL EROSION?

By L. D. Bayer; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 1-5. 1950.

The seriousness of soil erosion varies inversely with the quality of the soil management practices of the man on the land. Any practice that permits appreciable removal of surface soil is serious enough to warrant earnest attention and consideration. If there is continued erosion under the best management practices in agriculture then erosion becomes so serious as to enter the alarm or disaster stage. This is particularly true when gullies cannot be contained and where the exposed subsurface layers are bedrock that cannot be changed into soil except through nature's long process of rock weathering.

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RAINDROP IMPACT AS THE FORCE INITIATING SOIL EROSION.

By Paul C. Ekern; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 7-10. 1950.

Four aspects of the mechanics of drop erosion were considered in this study; the influence of the total amount of energy applied to the area; the influence of the unit in which that energy was applied; the influence of the particle size eroded; and the influence of the slope of the area eroded.

Under rigidly controlled artificial precipitation the amount of fine sand transported by drop impact was directly proportional to the total mass of water supplied and to a factor representing the energy per unit area supplied by the individual drop.

Fine sand gave the largest amount of transport. Larger size particles underwent less transport by impact erosion. Smaller particles were compacted, the surface sealed, and a film of water developed at the surface which helped dissipate the energy of the falling drops and reduced the amount of transport.

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EVALUATION OF THE ERODIBILITY OF FIELD SURFACES WITH A PORTABLE WIND TUNNEL.

By A. W. Zingg; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 11-17. 1950.

This paper presents the results obtained by the use of a portable wind tunnel in evaluating the wind erodibility of plots representing various cultural practices in the high plains area.

Relationships between the surface drag of the wind and quantities of soil eroded from plots of varying soil structure, roughness, and vegetal cover are shown. The variability of results on a given plot is also shown, and factors governing this variability are cited.

The ability of residue and vegetal cover to change the velocity distribution of the wind near the soil surface is presented. Seasonal differences in soil structure and residue cover were measured, and their influence on erodibility is discussed.

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AGGREGATION OF CLAY SEPARATES FROM BENTONITE, KAOLIN, AND A HYDROUS-MICA SOIL.

By Andrew P. Mazurak; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 18-24. 1950.

Aggregates formed from coarse particles of the clay fraction appear to have a bimodal type of size distribution while those formed from colloidal particles have a sigmoid type. Moreover, the water-stability of aggregates, once their sizes are formed after wetting, are associated with the colloidal particles in the clay fraction. The curves for aggregates formed from the four kaolinitic clay separates were bimodal type; those for bentonitic aggregates showed variation of types of size distribution; and the curves for Hesperia aggregates formed from particle $> .15\mu$ were bimodal type while those from particles $< .15\mu$ were sigmoid.

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SOIL AGGREGATE STABILITY.

By D. O. Robinson and J. B. Page; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 25-29. 1950.

Data obtained in this study indicate that the organic matter associated with the clay fraction and presumably adsorbed on the surfaces of the clay particles is the fraction most effective in aggregate stabilization. It would appear that in mineral soils the chief aggregate cementing agent is the clay with its adsorbed organic matter. This organic matter affects the surfaces and properties of the clay to make for greater aggregate stability than is possible with the clay, therefore, must be the basis of aggregate stabilization by organic matter.

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THE EFFECT OF SOYBEANS ON VOLUME WEIGHT AND WATER STABILITY OF SOIL AGGREGATES, SOIL ORGANIC MATTER CONTENT, AND CROP YIELD.

By Edward Strickling; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 30-34. 1950.

There was a linear relationship between soil aggregates greater than 1.00 mm. and soil aggregates greater than 0.25 mm. in the soil from these plots. There was little seasonal variation in soil aggregate stability in 1947 and 1948, but in 1949 the soil under each crop varied in a characteristic manner. The variation in soil aggregate stability between monthly samplings showed definite seasonal trends rather than large unexplainable variation. Soybeans and corn had about the same effect on soil aggregate stability. Soybeans as a crop seemed to be less depressing on the soil productivity than corn when judged by crop yield. There was no apparent relationship between soil aggregation and crop yields on these plots. Soil organic matter content was a good indication of soil aggregate stability. There was no correlation between aggregate stability and volume weight of soil aggregates.

THE DISTRIBUTION OF TRACTOR TIRE COMPACTION EFFECTS IN CECIL CLAY.

By V. C. Jamison, H. A. Weaver, and I. F. Reed; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 34-37. 1950.

A study was made of the compactive effects of a rear wheel pneumatic farm tractor tire on Cecil clay in a test bin at the U. S. Tillage Machinery Laboratory. Ten passes were made in the same track for each test across three moisture conditions, each at three initial states of compaction. Bulk densities of sample cores taken at varying depths and distances were used to determine the pattern of compactive effects for each initial soil condition. The results are presented in cross section diagrams. Track depth, maximum bulk density, and depth of penetration of compactive effects increased with moisture and initial looseness of the soil. The depth to which compaction was observed was nearly as great in the "moist" as in the "wet" soil condition, being evident at depths varying from 17 inches below the surface in the loose to 12 inches in the heavily compacted state. The tire did little more than loosen about an inch of soil by slippage of the lugs where the soil was dry and compacted.

THE FALLING WATER TABLE IN TILE AND DITCH DRAINAGE.

By Don Kirkham and R. E. Gaskell; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 37-42. 1950.

An equation for the rate of fall of a water surface is derived in terms of the hydraulic head

function, the slope of the water table, the soil permeability, and drainable porosity. The equation is used in several examples to determine the position of the water surface in tile and ditch drained land when there is an impermeable layer underlying the draining soil and when the soil is initially water-saturated to the surface. The successive shapes of the water table are the same in a sandy soil as in a clay soil but the water surface pass through the positions more rapidly in a sandy soil than in a clay soil. For ditch spacings of about 10 to 20 times the distance from the soil surface to the impermeable layer, the time for the water table to drop one foot midway between ditches appears to vary as about the square of the ditch separation. This quadratic relationship should also apply to tile drainage if the tile trench is backfilled with highly permeable material. The computational method developed, although simple in principle, requires considerable labor to obtain accurate results when the spacing between drainage facilities is large.

FLOW OF SOIL MOISTURE IN THE UNSATURATED STATE.

By Walter H. Gardner and Willard Gardner; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 42-50. 1950.

It would appear from the experimental data obtained for a typical soil, that in addition to a pressure gradient due to variation of soil moisture content from point to point in the soil, there may be a gradient due to the dynamic process itself.

It is perhaps unfortunate that f is not a function of p alone, but this should not constitute an insurmountable obstacle in applications. Modifications may be made to simplify the analysis at the expense of some precision. The experimental data do indicate that the permeability decreases rapidly with the moisture content.

INFILTRATION AND PERMEABILITY IN SOIL OVERLYING AN IMPERMEABLE LAYER.

By D. D. Evans, Don Kirkham, and R. K. Frevert; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 50-54. 1950.

As a preliminary step in the establishment of a controlled drainage experiment, where a small field would be tiled and flooded, an experiment was performed to gain pertinent information regarding the quantity of water needed for the flooding operation. At the same time, characteristics of water flow in a soil with an impermeable layer were studied.

WATER RETENTION BY CLAYS.

By C. M. Woodruff; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 54-56. 1950.

The dehydration curves of three typical clays, kaolinite, beidellite, and montmorillonite were determined over the pF range from 0 to 7. The results suggest that three different mechanisms may operate to retain water in a clay system under a moisture stress. The first and most important force in most clays is that the adsorption of water is associated with the familiar phenomena of swelling and shrinking. The second mechanism is that associated with structural formation in the clay, and it was operative primarily in the highly hydrated or low moisture tension range of the montmorillonite. It, like adsorption, is associated with swelling and shrinkage. The third mechanism of significance was that of surface tension active in the higher moisture tension range where particles come in contact and shrinkage ceases. This phenomena is associated with the coarser, less hydrated kaolinite and is probably of some consequence at the lower moisture tensions of most kaolinite systems containing appreciable amounts of the coarser fractions. The investigation was confined to nonsaline systems.

SALINITY EFFECTS ON SOIL MOISTURE-ELECTRICAL RESISTANCE RELATIONSHIPS.

By Geo. Yuan Ewart and L. D. Baver; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 56-63. 1950.

There is general agreement in data from three different tests covering the reliability of Bouyoucos plaster of Paris units in measuring moisture when the salinity of the irrigation water used is up to and including 2000 ppm NaCl. There is also general agreement in data obtained from two different tests comparing the susceptibilities of Bouyoucos blocks and Colman fiberglass units. The results indicate that fiberglass units are very sensitive to the electrolytic effects of salts and that a concentration of 1000 ppm NaCl is sufficient to produce a significant lag in resistance value.

PROPOSED METHOD OF LEACHING TILE-DRAINED LAND.

By James N. Luthin; Soil Sci. Soc. of Amer. Proc. Vol. 15, pp. 63-68. 1950.

Where soils are drained by tile, it is difficult to leach all of the soil adequately. Most of the flow to the tile line occurs over the tile line leaving a large portion of the soil, intermediate between the tile lines, relatively unleached. It is proposed that a diking arrangement be used so that certain selected surface

areas can be ponded while other surface areas remain dry. The relaxation method of solving Laplace's equation is used to get the distribution of hydraulic head for several different diking and ponding arrangements.

AVAILABILITY OF PHOSPHATE ROCK AS AFFECTED BY PARTICLE SIZE AND CONTACT WITH BENTONITE AND SOIL OF DIFFERENT pH VALUES.

By L. L. Joos and C. A. Black; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 69-75. 1950.

Ground phosphate rock of different particle sizes was incubated for 5 months with bentonite at different pH values. In a duplicate set of treatments the phosphate rock was added to incubated bentonite at the end of the incubation period. The bentonite-phosphate rock mixtures were then mixed with sand supplied with nutrients other than phosphorus, and Sudan grass was grown as a test crop. Different rates of monocalcium phosphate were included for comparative purposes. The availability of the phosphate rock was relatively high at pH 4.6 and pH 5.6 but was low at pH 6.6. Incubation increased the availability of the phosphate rock at pH 4.6 and 5.6 but reduced it at pH 6.6. The amounts of phosphate extracted from the bentonite-phosphate rock mixtures by a 1.5 percent sodium carbonate solution were correlated with the plant yields, and showed that during incubation a reaction had taken place between the phosphate rock and the bentonite at pH 4.6 and pH 5.6. The reduction in availability and sodium carbonate solubility of the phosphate from incubation at pH 6.6 is indicative of a decrease in effective or total surface area of the phosphate rock during incubation.

MINERALOGICAL CHARACTER OF SOME IRON AND ALUMINUM PHOSPHATES CONTAINING POTASSIUM AND AMMONIUM.

By J. F. Haseman, J. R. Lehr, and J. P. Smith; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 76-84. 1950.

Precipitated phosphates of iron and aluminum were digested for long periods in solutions containing various concentrations of the phosphates of lithium, potassium, ammonium, cesium, calcium, and magnesium at various temperatures and pH's. Most of the 150 products were crystalline, and many of them contained essentially one mineral form. From their chemical compositions, powder X-ray diffraction patterns, and optical properties, the minerals were classified into nine groups. The minerals in a given group were similar in crystal structure, and most of them showed isomorphic substitution of iron for aluminum or of ammonium for potassium.

The digestion of precipitated phosphates of iron and aluminum in solutions of potassium or ammonium phosphate invariably resulted in the adsorption of potassium or ammonium by the solid to form a complex phosphate of the respective uni- and trivalent cations. Similar digestions in solutions of the phosphates of lithium, cesium, calcium, or magnesium phosphate yielded variscite, strengite, or berlinite.

SOLUBILITY EQUILIBRIUM CONSTANT OF DIHYDROXY ALUMINUM DIHYDROGEN PHOSPHATE RELATING TO A MECHANISM OF PHOSPHATE FIXATION IN SOILS.

By C. V. Cole and M. L. Jackson; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 84-89. 1950.

The solubility equilibrium constant of dihydroxy aluminum dihydrogen phosphate - $\text{Al}(\text{OH})_2\text{H}_2\text{PO}_4$, variscite crystal species - was determined to be 2.8×10^{-29} . This constant relates the equilibrium concentration of phosphorus in the soil solution (availability) directly to the aluminum activity of the soil. This conclusion on the reaction mechanism of phosphate fixation in soils is extended to include the iron activities on the basis of the similar properties of dihydroxy iron dihydrogen phosphate - $\text{Fe}(\text{OH})_2\text{H}_2\text{PO}_4$, strengite crystal species - and the isomorphous relationships of aluminum and iron in the variscite-barrandite-strengite crystal series. The solubility equilibrium constant is of such magnitude as to cause formation of this series in acid soils containing reactive aluminum and iron when soluble phosphate fertilizers are added.

IMPORTANCE OF SOIL ORGANIC AND INORGANIC PHOSPHORUS TO PLANT GROWTH AT LOW AND HIGH SOIL TEMPERATURES.

By M. T. Eid, C. A. Black, and O. Kempthorne; Soil Sci. Soc. of Amer. Proc., Vol. 15, p. 89. 1950.

The plant-available P in a group of soils was estimated at soil temperatures of 20° and 35° C on the assumption that the response to P obtained in a greenhouse experiment followed the Mitscherlich law. By multiple linear regression the dependence of the plant-available P on the following soil P fractions was calculated: (1) inorganic P soluble in a solution 0.03 N to NH_2F and 0.025 N to HCl ; (2) organic P soluble in hot 1 percent K_2CO_3 and hydrolyzed by KOH ; (3) organic P soluble in hot 1 percent K_2CO_3 . At 20° C the plant-available soil P was determined by inorganic fraction 1. Organic fraction 2 had no appreciable effect. At 35° C the plant-available soil P was determined by both inorganic fraction 1 and organic fraction 2. Organic fractions 3 and 4 were of no importance

at either temperature. A probable cause of the observed results is that at 20° C the rate of organic P mineralization was low and the plant was dependent on inorganic fraction 1 originally present. At 30° C the plant was supplied with inorganic fraction 1 plus additional inorganic P from the mineralization of organic fraction 2

WATER-SOLUBLE SILICATE APPLICATION TO A CALCAREOUS CLAY SOIL AND EFFECT ON SOIL PROPERTIES AND NUTRIENT UPTAKE BY PLANTS.

By W. Derby Laws; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 89-92. 1950.

In general, the potassium and nitrogen content of the crop increased while the calcium content decreased and the phosphorus content was not significantly affected by an increase in the amount of silicates applied. Application of soluble silicates resulted in an increase in crop yield in some cases. The easily soluble soil phosphorus extracted by different extracting reagents increased with an increase in the amount of silicate applied. Silicate treatment of the soil decreased its capacity to adsorb phosphate from solution. Dehydration of the colloid from a silicate treated soil indicates that the OH ions are involved in the reaction between soluble silicates and the soil colloids of Houston black clay.

DECOMPOSITION OF BENTONITE AS INFLUENCED BY ADSORBED HYDROGEN AND CALCIUM PLUS GRINDING.

By A. T. Perkins and R. D. Draggendorf; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 93-97. 1950.

Dry grinding of bentonite causes its decomposition so that the aluminum and silicon are more reactive and soluble. The decomposition of bentonite and other clay minerals may result in the temporary formation of amorphous silicas, aluminas, or their hydrates, which may recombine into the original clay mineral or other clay minerals of similar structure. This is substantiated by particle size, pH values, titration curves, soluble Al_2O_3 , base exchange capacity, and X-ray powder patterns.

EFFECTS OF ACIDIFICATION, IRON OXIDE ADDITION, AND OTHER SOIL TREATMENTS ON SORGHUM CHLOROSIS AND IRON ABSORPTION.

By R. V. Olson; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 97-101. 1950.

In order to determine the influence of different iron oxide forms, acidifying agents, salts, and

iron-bearing materials on the chlorosis of sorghums, greenhouse pot experiments were conducted with 3 soils during 2 seasons. Early Sumac sorghum and Westland milo were grown. Yields, chlorophyll, total and active iron, calcium, and magnesium contents were determined.

None of the synthetic or naturally-occurring iron oxides influenced sorghum growth. With one chlorosis-producing soil 500 pounds of ferrous sulfate per acre did not affect growth; with another, 1,000 pounds of ferrous sulfate increased chlorophyll production and total iron adsorption. Coal mine refuse containing pyrite and ferrous sulfate improved chlorophyll production. Sulfur decreased chlorosis but did not affect iron absorption.

Sulfuric acid treatment increased yields and decreased chlorosis with both chlorosis-producing soils, while total iron absorption was increased with one soil and decreased with the other. Calcium salts did not affect sorghum growth, but sodium chloride caused a reduction in chlorophyll formation. None of the treatments influenced the active iron content of plant leaves.

INTERRELATIONSHIPS OF POTASSIUM, SODIUM, AND CALCIUM AS SHOWN BY THEIR ACTIVITIES IN A BEYDELITE CLAY.

By E. O. McLean; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 102-106. 1950.

This is an effort to throw more light upon cationic interrelationships presumably existent in the plant root environment. The clay membrane offers a technique for measuring these mutual effects to which the plant root is subjected in extracting its inorganic sustenance from the soil.

ON THE VALIDITY OF INTERPRETATIONS OF POTENTIOMETRICALLY MEASURED SOIL pH.

By N. T. Coleman, D. E. Williams, T. R. Nielsen, and H. Jenny; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 106-114. 1950.

A theory which related junction potentials observed in colloidal systems to differential mobility of cations and anions in such systems is outlined. The theory was tested for 12 soils by comparing measured junction potentials in KCl solution-K-soil systems with values derived from consideration of current flow through these systems. Agreement between experimentally determined emf's and those predicted by theory was satisfactory.

The suspension effect, i.e., the pH difference

between supernatant liquid and a soil suspension of sediment, was measured for the 12 soils. Correlation between the emf corresponding to the suspension effect and E_j , the measured junction potential, was close.

It was concluded that the measured emf which is interpreted in terms of soil pH includes two terms, the activity of the hydrogen ion and a junction potential ($-\log a_h + E_j$). The latter was appreciable for all soils studied, and may be very large in some cases. Consequently, the potentiometrically measured pH of soil suspensions or pastes cannot be entirely attributed to the activity of hydrogen ions.

DETERMINATION OF IONIC ACTIVITIES IN SOIL-WATER SYSTEMS BY MEANS OF THE DONNAN MEMBRANE EQUILIBRIUM.

By Michael Peech and A. D. Scott; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 115-119. 1950.

A method, based on the Donnan membrane equilibrium, for the determination of cation activities in soil-water systems is described and typical data on montmorillonite clay suspensions are presented to establish the validity of the method and to show how the method can be used to study the dissociation and hydrolysis of the exchangeable cations.

AVAILABILITY OF AMMONIUM FIXED IN DIFFICULTY EXCHANGEABLE FORM BY SOILS OF SEMIARID REGIONS.

By C. A. Bower; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 119-122. 1950.

The nitrification rates and the availability to plants of readily and difficulty exchangeable NH_4 supplied in two soils are compared.

MECHANISM OF SORPTION OF HYDROXY CUPRIC ION BY CLAYS.

By R. G. Menzel and M. L. Jackson; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 122-124. 1950.

Cupric solutions equilibrated with potassium clays often show (a) increase in hydrogen ion concentration and (b) sorption of more milliequivalents of copper by the clay than the number of milliequivalents of potassium released. Hydroxy cupric ion constitutes at least 50 percent of the copper sorbed by Kaolinite or montmorillonite from cupric solutions only 1 percent hydrolyzed. Hydroxy cupric ion sorption is increased by increasing cupric ion concentration or increasing pH of cupric solution. It is more

pronounced with Kaolinite than with montmorillonite.

These facts may be explained by hydrolysis of cupric ions sorbed on the clay. The retention of hydroxy ions by clays is favored by lattice building of these ions onto the clay crystal.

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EXCHANGEABILITY OF SOIL POTASSIUM IN THE SAND, SILT, AND CLAY FRACTIONS AS INFLUENCED BY THE NATURE OF THE COMPLEMENTARY EXCHANGEABLE CATION.

By H. D. Merwin and Michael Peech; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 125-128. 1950.

Four widely different New York Soils, representing the Dunkirk, Mardin, Honeoye, and Gloucester series were leached with successive portions of 0.5N acetate solutions of different cations. The amount of potassium exchanged by the different cations decreased in the following order: $\text{Na} > \text{H} > \text{NH}_4 > \text{Mg} > \text{Ca} > \text{Ba}$. Three of the soils investigated not only failed to release potassium to the 0.5N barium and calcium acetate solutions, but effectively removed the trace of potassium present as an impurity in these salt solutions. In contrast to the continued extraction of potassium by the sodium acetate and the acetic acid solution, the ammonium acetate solution gave a very clear-cut separation of the exchangeable potassium. The amount of potassium released by sand, silt, and clay fractions was also determined. The sands released very little potassium; the silts contributed from 15 to 50 percent whereas the clays contributed from 40 to 80 percent of the total potassium released by the soils. The release of potassium by the whole soil or the clay fraction was greater in the presence of calcium than in the presence of hydrogen as the complementary exchangeable ion.

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TRANSFORMATION OF ILLITE INTO MONTMORILLONITE.

By Joe L. White; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 129-133. 1950.

The transformation of illite into montmorillonite has been accomplished by use of a potassium precipitating reagent, sodium cobaltinitrite. It has been shown that the reaction can occur at both high and low temperatures. MgCl_2 can also produce this transformation. Application of the precipitating reagent to the determination of the potassium-supplying power of soils is suggested.

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COMPLEMENTARY ION EFFECTS IN SOILS AS MEASURED BY CATION EXCHANGE BETWEEN ELECTRODIALYZED HYDROGEN CLAY AND SOILS.

By D. A. Brown and Wm. A. Albrecht; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 133-138. 1950.

Complementary ion effects in soils were measured through the utilization of the potential for cation exchange established between electro-dialyzed hydrogen clay and soil when these two systems were separated by a collodion membrane. Quantitative data are presented to show the effect of increasing levels of sodium saturation and percentage of calcium carbonate in the soil upon the suite of cations exchanged.

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QUANTITATIVE ESTIMATION OF MINERALS IN THE FINE SAND AND SILT FRACTIONS OF SOILS WITH THE GEIGER COUNTER X-RAY SPECTROMETER.

By M. M. Phillippe and J. L. White; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 138-142. 1950.

Using the specimen mounting technique of McCreery, a procedure involving the use of NaF as an internal standard was devised which makes possible the quantitative determination of certain soil minerals by use of a Geiger counter X-ray spectrometer. A linear relationship exists between the ratio of the peak heights of the characteristic line of quartz, albite, and microcline / 2.32\AA line of NaF and percent composition. Results are given for several Indiana soils.

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THE CATAPHORESIS OF CLAY MINERALS AND FACTORS AFFECTING THEIR SEPARATION.

By A. H. Beavers and C. E. Marshall; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 142-145. 1950.

The cataphoretic velocities of freshly electro-dialyzed clays and the same clays with additions of sodium hydroxide were determined.

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COBALT DETERMINATION IN SOILS BY SPECTROGRAPHIC ANALYSIS FOLLOWING CHEMICAL PRECONCENTRATION.

By R. A. Carrigan and T. C. Erwin; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 145-149. 1950.

Analyses for cobalt were made in whole soils, following hydrofluoric acid attack, and in extracts prepared with ammonium acetate, acetic acid, and hydrochloric acid. Cobalt was concentrated from the soil extract by solvent extraction with dithizone in carbon tetrachloride solution. The analysis was completed by conventional arc spectrography. As little as 0.1 microgram of cobalt can be determined.

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TURBIDIMETRIC DETERMINATION OF AVAILABLE SULFATES.

By Leon Chesnin and C. H. Yien; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 149-151. 1950.

A turbidimetric method of determining the available sulfate content of soils is presented. The sulfates were extracted from the soil with Morgan's solution and then precipitated with 30- to 60-mesh barium chloride crystals. The precipitates were kept in suspension with a gum acacia solution, and turbidity readings were made in a photoelectric colorimeter.

Results obtained with this method compared favorably with those obtained gravimetrically. The turbidimetric method is rapid and permits the determination of sulfates in volumes of solution which cannot be measured by ordinary gravimetric means.

PREPARATION OF PERMANENT PLASTIC COLOR STANDARDS FOR RAPID SOIL AND PLANT TISSUE TESTING.

By J. Q. Lund and L. M. Turk; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 152-153. 1950.

A method was devised for making permanent plastic standards for testing methods. These plastic standards are excellent duplications of the color and turbidity developed in standard solutions. They are very stable, resistant to fading, and are not easily broken.

THE AVAILABILITY OF POTASSIUM IN CERTAIN MINERALS TO ASPERGILLUS NIGER.

By Charles F. Eno and Herbert W. Reuszer; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 155-159. 1950.

The amount of potassium released was very greatly in excess of the exchangeable potassium present in the mineral.

Slightly more potassium was released in the presence of growing fungi than in control cultures in which no growth took place. The nutrient medium supplied for growth of the organism had a high capacity for displacing potassium from the minerals.

COMPARATIVE EFFECTS OF TWO BACTERIAL GROWTH PREVENTIVES, ACID (pH 4) AND ROSE BENGAL PLUS STREPTOMYCIN, ON THE NATURE OF SOIL FUNGI DEVELOPING ON DILUTION PLATES.

By James P. Martin and Robert B. Harding; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 159-162.

1950.

This study was carried out to test a new medium on a relatively large number of soils, and to compare the numbers and kinds of fungi developing on the plates with those growing on the same medium acidified to pH 4 to prevent growth of bacteria and streptomycetes.

NITROGEN GAS PRODUCTION BY THE REACTION OF NITRITES WITH AMINO ACIDS IN SLIGHTLY ACIDIC MEDIA.

By Frank E. Allison and Janet Doetsch; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 163-166. 1950.

Chemical studies conducted in Warburg respiration vessels, using an indirect and a direct method of measuring nitrogen gas production, showed that nitrous acid can react with an amino acid such as alanine to form nitrogen gas at pH values of 4.5 and lower.

THE USE OF TRACER TECHNIQUES IN THE SIMULTANEOUS MEASUREMENT OF MINERALIZATION AND IMMOBILIZATION OF NITROGEN IN SOIL.

By A. E. Hiltbold, W. V. Bartholomew, and C. H. Werkman. Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 166-173. 1950.

A method is presented employing tracer techniques in the estimation of nitrogen interchange in soils. Measurements were made of the depletion and dilution of fertilizer nitrogen in the soil mineral nitrogen along with uptake by the crop of fertilizer and nonfertilizer nitrogen. Determinations made at four sampling dates provided a measure of rates of interchange.

THE EFFECTIVITY OF DIFFERENT STRAINS OF RHIZOBIUM ON ANNUAL AND PERENNIAL LESPEDEZAS.

By Lewis W. Erdman; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 173-176. 1950.

Using greenhouse techniques, 14 strains of nodule bacteria isolated from perennial lespedezas and 12 strains from annual lespedezas, were tested on *L. cuneata*, *L. stipulacea*, and *L. striata* var. Kobe.

DIFFERENTIAL RESPONSE OF STRAINS OF LOTUS NODULE BACTERIA TO SOIL TREATMENT PRACTICES.

By D. L. Lynch and O. H. Sears; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 176-180. 1950.

Experimental work was undertaken to determine if maximum benefit is being obtained from the use of nodule bacteria of high nitrogen-fixing efficiency on many soils and if differential strain response is obtained with varying fertilizer applications.

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THE GENERIC CLASSIFICATION OF CERTAIN CELLULOLYTIC BACTERIA.

By Francis E. Clark. Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 180-182. 1950.

Type strains of seven cellulolytic bacteria heretofore assigned to *Cellulomonas* or *Bacterium* were found to show the gram-staining variability and the morphological appearance of *Corynebacterium*, particularly as represented by *Corynebacterium fimi*. Only very minor physiological differences were found to exist between *C. fimi* and the following species: *Cellulomonas biazotea*, *C. cellasea*, *C. flavigene*, *C. gelida*, *C. subalbus*, and *Bacterium undum* and *B. liquatum*. The question of whether these last-named species should be assigned to *Corynebacterium*, or whether they together with *C. fimi* should be assigned to *Arthrobacter*, is briefly discussed.

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STUDIES ON THE EFFECT OF MICROORGANISMS ON RATE OF PERCOLATION OF WATER THROUGH SOILS.

By T. M. McCalla. Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 182-186. 1950.

A laboratory study was made to determine the effect of some treatments applied to soils in either a wet or submerged condition on water percolation through a layer of soil. This would correspond to the initial incubation period before drying, used for water spreading.

When organic materials were added to a wet or submerged soil the percolation rate declined at a more rapid rate than with the untreated soil. The addition of sucrose to a wet soil kept in a refrigerator did not result in the low percolation that occurred when sucrose was added to a wet soil held at room temperature for the same period. When sucrose was added to Peorian loess there was a sharp drop in the percolation rate in a few days. Untreated Peorian loess under continuous percolation for 53 days had about the same percolation rate at the end of this period as during the first 4 or 5 days. When sucrose was added either at the beginning or after 53 days to Peorian loess, the percolation rate dropped sharply. The use of 10 ppm of mercuric chloride in the water was effective in maintaining a high intake under prolonged submergence.

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THE RHIZOSPHERE EFFECT OF ONION AND GARLIC ON SOIL MICROFLORA.

By M. I. Timonin and R. H. Thexton. Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 186-189. 1950.

Comparison of the microflora of the rhizosphere soil, root tissues of onion and garlic plants, and the control soil was made by the use of non-selective and selective media.

It was found that the rhizosphere soil of onion and garlic harbored 11 and 12 times respectively more bacteria, and 6 and 3 times more actinomycetes than the control soil. Counts of fungi were found to be 2.5 times greater in the rhizosphere of onion than in the control soil. Rhizosphere of garlic did not show the same stimulative effect upon the fungus flora.

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MICROBIAL PRODUCTS AND SOIL ORGANIC MATTER: III. ADSORPTION OF CARBOHYDRATE PHOSPHATES BY CLAYS.

By C. A. I. Goring and W. V. Bartholomew. Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 189-194. 1950.

The adsorption of several carbohydrate phosphates and orthophosphate over a wide pH range by coarse and fine samples of bentonite, illite, and kaolinite and by subsoil samples was studied. The concentration of the adsorbents in suspension was 0.6 percent and of phosphorus 0.025 to 0.075 mg per ml.

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STUDIES ON THE VALUE OF SODIUM IN THE MINERAL NUTRITION OF COTTON.

By O. R. Iunt and W. L. Nelson. Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 195-200. 1950.

The effect of Na on hydration of the plant, transpiration losses, yields, fiber properties, and oil content of the cottonseed were studied over a range of K levels using sand culture technique. The effects of Na and K on the uptake of other bases were also studied.

Increasing either Na or K increased the hydration of the protoplasm. Na had no effect on the transpiration losses of young cotton plants. High levels of K increased transpiration losses slightly, however.

Na increased the yield of seed cotton by as much as about 25 percent at deficient levels of K but did not increase the yields at adequate levels of K.

Increasing the sodium supply increased the breaking strength of the fiber but decreased the upper half mean. Na did not statistically affect

the mean length of fineness of the fiber. K additions did not affect the breaking strength of the fiber but increased the upper half mean, mean length, and the coarseness of the fibers.

Na had little effect on the uptake of K except when the plant became mature. At this age Na decreased the uptake of K. Na did not affect the accumulation of Ca in young cotton roots, but reduced the content of Ca in the tops, seed and mature roots. Na decreased the concentration of Mg in cotton roots and in mature tops.

Increasing the level of K reduced the absorption of Na. K also reduced the concentration of Ca and Mg in the tops but not in the roots of cotton plants.

THE EFFECT OF SOIL EXCHANGEABLE CATIONS ON SWISS CHARD AND COTTON.

By Guy B. Baird and A. Mehlich; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 201-205. 1950.

The effect of exchangeable Ca, Ba, Sr, Mg, K, Na, NH_4 , and H ions on the growth and mineral content of Swiss chard and cotton was studied in greenhouse pot cultures. The degree of Ca saturation ranged from 10 to 80 percent, the remainder in each case being made up by one of the other complementary ions.

At the highest level of Ca there were no significant differences in growth of Swiss chard, and only slight differences in the case of cotton, irrespective of the complementary ion. At the lowest level of Ca both species of plants failed to grow where the complementary ion was Ba, H, or Na. In addition cotton failed at this Ca level when Sr or K was the complementary ion. In general the growth of Swiss chard was less affected by type and level of complementary ion than was that of cotton.

EFFECT OF MAGNESIUM ON THE QUALITY AND YIELD OF CANNING PEAS.

By A. E. Peterson and K. C. Berger; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 205-208. 1950.

The effect of varying amounts of available magnesium on the quality and yield of Alaska peas was investigated by means of nutrient water cultures under greenhouse conditions.

UTILIZATION OF FERTILIZER AND SOIL P BY OATS AND CRIMSON CLOVER AS AFFECTED BY RATES AND RATIOS OF ADDED N AND P_2O_5 .

By J. C. Smith, J. F. Fudge, L. C. Kapp, J. E.

Adams, R. W. Pearson, and Howard Leap, Jr.; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 209-212. 1950.

The effects of amounts and ratios of N and P_2O_5 and stage of growth on the utilization of fertilizer P and of soil P by pure stands of oats and crimson clover were investigated. Fertilizer treatments included all possible combinations of rates of 0, 30, and 60 pounds of N with 0, 60, 120, and 180 pounds of P_2O_5 per acre.

THE NITROGEN AND PHOSPHORUS CONTENT OF WINTER OAT FORAGE AT VARIOUS CLIPPING DATES AS AFFECTED BY APPLICATIONS OF NITROGEN.

By Charles W. Domby, Matthias Stelly, and O. E. Sell; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 213-218. 1950.

This paper is concerned with the effect of various fertilizer and nitrogen top-dressing treatments on the nitrogen and phosphorus content of winter oat forage.

PHOSPHORUS SUPPLYING POWERS OF SOILS FOR OATS.

By C. I. Rich and O. J. Attoe; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 219-222. 1950.

The phosphorus supplying powers of five soils, important to Wisconsin, were estimated by their capacities to release both native and applied phosphorus to six successive crops of oats grown in pots. Changes in the contents of available phosphorus of the soils during the course of cropping were also studied.

SOME FACTORS AFFECTING THE ABSORPTION OF CHLORINE BY TOBACCO.

By H. M. Reisenauer and W. E. Colwell; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 222-229. 1950.

The objective of this investigation was to study the factors affecting chlorine supply and uptake in an attempt to explain the high absorption of this element from recently cleared land.

EFFECTS OF WINTER COVER CROPS ON SOIL PROPERTIES AND YIELDS IN A COTTON-CORN AND IN A COTTON-PEANUT ROTATION.

By C. D. Welch, W. L. Nelson and B. A. Krantz; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 229-234. 1950.

It is the purpose of this paper to present data

comparing the effects of certain winter cover crops in a 2-year rotation of cotton-corn and a 2-year rotation of cotton-peanuts during the period from 1945 to 1949. One cover crop in a continuous cotton rotation is included. Soil and plant analyses and penetrometer data are also presented.

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THE INFLUENCE OF NITROGEN SUPPLY ON THE GROWTH AND NITROGEN FIXATION OF HAIRY VETCH.

By Frank G. Viets, Jr., and Carl L. Crawford; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 234-237. 1950.

The greenhouse studies reported here were conducted to determine what effect the available nitrogen supply in the soil would have on vetch growth and the quantity of nitrogen fixed by Rhizobia on vetch roots.

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EFFECTS OF SIXTEEN YEARS OF GREEN MANURING ON THE FERTILITY OF A KIRKLAND SILT LOAM SOIL.

By M. J. Plice; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 238-289. 1950.

It is shown that the turning-under of leguminous green manures in a Kirkland silt loam soil, for a period of 16 years, has produced several changes in the soil as follows: sorghum and cotton crops have not been benefited and the yields of oats crops, both grain and straw, have been significantly reduced. Concomitantly, by comparison with the no-green-manure soils, the green-manure soil is somewhat lower in pH, available mineral nutrients, organic matter and nitrogen, bacterial and fungal population, field moisture capacity, nitrifying power, macro and micro aggregates, and rate of water infiltration. Conversely the green-manure soil is higher in volume weight, plasticity, weak-alkali-soluble organic matter and nitrogen, redox potential, ammonifying power, toxic humic substances, potential and exchangeable acidities, and wilting coefficient.

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CAUSES OF VERY POOR GROWTH OF CROPS ON A FORMERLY PRODUCTIVE SOIL.

By B. A. Brown, Arthur Hawkins, E. J. Rubins, A. V. King, and R. I. Munsell; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 240-243. 1950.

In the thirteenth consecutive year of growing potatoes, a formerly productive soil was found to be very unproductive, though liberally fertilized with NPK Mg. The fine sandy loam soil was strongly acid (pH 5.0), very high in soluble Al and Mn, high in available P and K, but low in

Mg and Fe, and very low in Ca. Barley, lettuce, millet, potatoes, rye, soybeans, and tomatoes had very small root and top developments on the untreated soil.

Of many treatments, any that reduced the acidity of the soil were beneficial; those that increased the acidity accentuated the trouble. Large amounts of superphosphate, though not decreasing the acidity, improved markedly the top growth of plants, but root development was still much restricted. Either heavy liming or moderate liming plus heavy superphosphate has resulted in normal growth.

The toxic effects of Cu, Mn, and Al were considered as direct causes of the trouble. The evidence appears strongest for Al, but definite conclusions have not been reached.

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PROGRESS REPORT ON A STUDY OF SOIL CHARACTERISTICS IN FORTY HIGH-PERFORMANCE ORANGE ORCHARDS IN CALIFORNIA.

By R. B. Harding and H. D. Chapman; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 243-248. 1950.

This paper reports the results of a detailed study of the physical, biological, and chemical condition of the soil and of management practices in a group of top-performing orchards.

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NUTRIENT STATUS OF SOILS ON COMMERCIAL POTATO PRODUCING AREAS OF RHODE ISLAND.

By H. G. Allbritten, T. E. Odland, and M. Salomon; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 248-251. 1950.

Soil fertility experiments were conducted on local potato farms in Rhode Island in 1947 to 1949. It was found that many potato growers are using more fertilizer per acre than is necessary, and often the wrong grade is used for maximum yields. Where potatoes are grown frequently or continuously, phosphorus and potash accumulate in the soil in excess of that required for crop growth.

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IRON-MANGANESE RATIOS IN NUTRIENT SOLUTIONS IN RELATION TO THE CHLOROSIS OF SORGHUM PLANTS.

By C. W. Carlson and R. V. Olson; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 251-254. 1950.

The object of this study was to evaluate the importance of the ratio of iron to manganese in the nutrient medium as a factor in the occurrence of chlorosis in sorghum plants.

HYPOTHESES CONCERNING LIME-INDUCED CHLOROSIS.

By D. W. Thorne, F. B. Wann, and Wilford Robinson; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 254-258. 1950.

Consideration of the observed facts in relation to various hypotheses advanced to explain the cause of lime-induced chlorosis indicates that only a few of the hypotheses will be of direct aid in solving the problem.

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USE OF SWEETCLOVER FOR DEEP-PLACEMENT OF PHOSPHORUS.

By R. J. Hervey, L. C. Kapp, J. R. Johnston, and J. C. Smith; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 258-262. 1950.

Results of a field experiment in which P^{32} tagged superphosphate was used at the rate of 60 pounds of P_2O_5 per acre, broadcast and banded, are presented. These show that sweetclover root systems are effective in translocating near-surface-applied P into lower depths of highly calcareous Houston Black clay. The phosphate fertilizer, when banded 2 inches below the seed, doubled plant growth and increased plant N from 82 to 172 pounds per acre in a growth period of 4 months. The roots of band-fertilized plants produced 2,518 pounds of dry matter per acre within the top 18 inches of soil. On this basis, 4.12 pounds of fertilizer P were distributed in this zone of root growth. The fertilizer provided 80 percent of the P in the roots and 60 percent of that in the tops.

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THE LONG-TIME EFFECT OF ROTATION LENGTH ON THE YIELD AND CHEMICAL CONSTITUENTS OF THE SOIL.

By B. L. Brage, M. J. Thompson, and A. C. Caldwell; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 262-264. 1950.

This study is concerned with the effects of differing lengths of rotation on the yielding capacity and chemical status of the soil. With the soils under investigation, length of rotation (3-, 4-, and 5-years) had little effect on yield except that the 4-year rotation was slightly below the 5- and 3-year in most cases.

Nitrogen and organic carbon contents of the soil increased with an increase in length of rotation. The length of rotation had no appreciable effect on the C:N ratios. There was less available phosphorus in the soils from the longer rotations. The pH was not affected to any extent by rotation length.

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STUDIES ON NITROGEN FERTILIZER UTILIZATION USING N^{15} .

By Robert MacVicar, William L. Garman, and Robert Wall; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 265-268. 1950.

Recovery of added fertilizer nitrogen by Sudan grass and oats was followed by means of isotope studies using N^{15} . Under greenhouse conditions from 38 to 47 percent of the added nitrogen was recovered in the plant leaf and root tissue, of which approximately 85 percent was in the aerial portions. Only slightly more of the nitrogen of the first clipping was derived from the fertilizer than was the case in the mature root or top, indicating that relatively rapid equilibration between the available nitrogen of the soil and the added fertilizer nitrogen had occurred.

It was not possible to account for all of the added fertilizer nitrogen in the crop residues or in the soil at the end of the experiment, suggesting the possibility of losses through denitrification. The largest losses were associated with a low level of soil organic matter and a high level of nitrogen application.

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SOME STUDIES ON THE BEHAVIOR OF SOIL BORON UNDER CROPPING.

By A. C. McClung and J. E. Dawson; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 268-272. 1950.

The results of this study suggest the existence in soils used of an equilibrium between the solid and solution phases of that fraction of soil boron which is soluble in water.

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AVAILABILITY OF POTASSIUM TO CROPS IN RELATION TO REPLACEABLE AND NON-REPLACEABLE POTASSIUM AND TO EFFECTS OF CROPPING AND ORGANIC MATTER.

By D. R. Hoagland and J. C. Martin; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 272-278. 1950.

In an intensive greenhouse cropping experiment with pot cultures of five soils using alfalfa and with larger outdoor installations of two soils cropped to mustard and Melilotus measurements of replaceable potassium were made.

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THE STATUS OF SOIL MANGANESE AS INFLUENCED BY MOISTURE, ORGANIC MATTER, AND pH.

By P. D. Christensen, S. J. Toth, and F. E. Bear; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 279-282. 1950.

The purpose of this study was to explore the changes in the soil Mn as influenced by pH, organic matter, and moisture, and to study the interaction of these factors.

PEAT FORMATION IN THE TROPICS AND SUBTROPICS.

By Harry Hudson Bailey; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 283-284. 1950.

There is an external similarity between organic soils of the tropics and subtropics and those of the temperate zones, but this similarity is merely superficial when we exclude the sphagnum peats that occur only at great heights and thus fall climatically into temperate zones. Most tropical organic soils present a color and textural profile that is inverted as compared to those of temperate areas. This appears to be a function of pH for the organic soils of the tropics accumulate faster as the pH goes from 7 or above to 4 or 3 and even lower. However, exceptions to this are found, as in the Florida Everglades and some papyrus-filled streams in tropical Africa.

THE INFLUENCE OF COPPER COMPOUNDS ON THE YIELD, GROWTH PATTERN, AND COMPOSITION OF SPRING WHEAT AND CORN GROWN ON ORGANIC SOIL.

By John C. Brown and Paul M. Harmer; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 284-291. 1950.

The purpose of this study was to investigate further the role which copper might play in these soils toward the stimulation of plant growth.

A STUDY OF THE EXCHANGE OF CALCIUM FOR HYDROGEN IN WOOD PEAT BY ACTIVITY METHODS.

By J. E. Dawson, R. E. Danielson, and D. M. Cameron; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 292-297. 1950.

One purpose of this present work was to compare the dilution curves of both hydrogen and calcium saturated peat with corresponding dilution curves of an ideal polyvalent weak acid. A second purpose was to compare the curve for titration of hydrogen peat with calcium hydroxide to the analogous ideal curve. A third purpose was to determine the standard free energy, enthalpy, and entropy for dissociation of hydrogen peat as an aid in interpretation of the dilution and titration curves.

THE PLACE OF SOIL AND TISSUE TESTING IN EVALUAT-

ING FERTILITY LEVELS UNDER EVERGLADES CONDITIONS.

By W. T. Forsee, Jr.; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 297-299. 1950.

As a result of this experiment and corroborative data from subsequent experiments, it is now possible to make accurate fertilizer recommendations for celery on the basis of careful tests made on representative soil samples collected from the proposed site of the crop. The only restrictions are the test must be conducted according to the identical procedure used for the experiments, and the soil must be of the same general type. The same method of approach holds for other crops. Tissue tests are proving an invaluable tool for diagnosing deficiencies on a growing crop, especially in those cases where a representative soil sample may be difficult to obtain.

THE EFFECT OF TIME, TEMPERATURE, AND PARTICLE SIZE ON THE RELEASE OF BASES FROM SOME COMMON SOIL-FORMING MINERALS OF DIFFERENT CRYSTAL STRUCTURE.

By J. E. McClelland; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 301-307. 1950.

This study was undertaken to determine what effects time, temperature, particle size, and degree of calcium saturation of the soil colloid, have on the release of bases from some of the commoner soil-forming minerals.

MINERAL CONTENTS OF THE SILT SEPARATES OF SOME MISSOURI SOILS AS THESE INDICATE THE FERTILITY LEVEL AND DEGREE OF WEATHERING.

By Richard H. Hawkins and E. R. Graham; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 308-313. 1950.

Soil minerals in the fine sand and silt fractions have long been considered an important source of reserve plant nutrients. When the silt predominates over other fractions in the surface soil, these minerals take on major importance if interpreted in terms of fertility reserves.

THE EFFECT OF WEATHERING ON THE CLAY MINERAL COMPOSITION OF SOILS IN THE MIAMI CATENA.

By O. W. Bidwell and J. B. Page; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 314-318. 1950.

This work was undertaken in order to determine: (1) the effect of soil formation processes, as

influenced by differences in drainage, on the clay mineral composition of soils derived from the same, or very similar parent material, and (2) to ascertain whether these differences in clay mineral composition might be partly responsible for the wide differences in the morphology of these soils of the Miami catena.

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STUDIES OF THE CHEMICAL AND PHYSICAL CHARACTERISTICS OF A CHRONO-LITHO-SEQUENCE OF LOESS-DERIVED PRAIRIE SOILS OF SOUTHWESTERN IOWA.

By Curtis E. Hutton; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 318-324. 1950.

A study was made on a 170-mile sequence of soils (Monona, Marshall, Sharpsburg, Grundy, and Seymour) developed from Peorian loess in Southwestern Iowa.

The concept is proposed that parent material is the dominating soil-forming factor for the area within 50 to 60 miles from the source of the loess, and that the effective time of weathering during the loess-deposition period has been the dominating soil-forming factor for those soils situated between 50 to 60 miles and 170 miles from the source of the loess.

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SOME CHEMICAL CHANGES ACCOMPANYING PROFILE FORMATION OF THE NEARLY LEVEL SOILS DEVELOPED FROM PEORIAN LOESS IN SOUTHWESTERN IOWA.

By Rudolph Ulrich; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 324-329. 1950.

The data presented here relate to the changes in several chemical properties which accompany the changes in physical properties for five soil profiles.

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THE PHOSPHORUS STATUS OF SOME AZONAL, PRAIRIE, AND CHERNOZEM SOILS IN EASTERN NEBRASKA.

By R. C. Lipps and Leon Chesnin; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 329-333. 1950.

An investigation was made of the phosphorus status of some Azonal, Prairie and Chernozem soils in eastern Nebraska. These soils included representative members of the Cass, Wabash, Marshall, Sharpsburg and Crete series.

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DIFFERENCES IN THE CLAY CONTENTS OF SURFACE SOILS DEVELOPED UNDER PRAIRIE AS COMPARED TO FOREST VEGETATION IN THE CENTRAL UNITED STATES.

By William D. Shrader; Soil Sci. Soc. of Amer.

Proc., Vol. 15, pp. 333-337. 1950.

There is a significant difference between the means of the surface soil clay contents of soil developed under prairie, under forest, and under prairie-forest transition vegetation. The differences in surface clay content are most marked between forest and prairie soils with the transition soils occupying a position about midway between the other two. The differences in surface clay content are most marked between the less developed soils and are slight for the highly developed soils. Under prairie vegetation there is first an increase in surface soil clay with increasing subsoil clay. This is followed by a marked decrease in surface clay with further increase in subsoil clay.

There is no consistent relationship between percent clay in the surface soil and percent clay in the subsoil in the forest soils. Available evidence indicates that the soils developed under grassland contain more montmorillonitic clay minerals than do the soils developed under forest.

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ROCK WEATHERING AND SOIL FORMATION IN THE NORTH CAROLINA PIEDMONT REGION.

By John G. Cady; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 337-342. 1950.

A soil derived from meta-gabbro and one derived from diorite, collected a few miles apart in Rowan County, N. C., were studied by means of thin sections, X-ray spectrometry, and other mineralogical methods. Though both are in the same environment and presumably of the same age, the soil from diorite was underlain by 20 feet of saprolitic rock while the other profile graded into solid rock at about 4 feet. First weathering products of the diorite were gibbsite, chlorite, and allophane. In later stages these minerals had disappeared and coarsely crystalline kaolinite, primary and secondary quartz, and iron oxides had entirely replaced the original rock. Micro-structural features of the C-horizon at 15-foot depth persisted well up into the B-horizon, though evidence for local movement of colloidal clay and iron oxides was seen.

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SOME CHARACTERISTICS OF THE SOILS OF THE DISMAL SWAMP SECTION OF PASQUOTANK COUNTY, NORTH CAROLINA.

By Arthur E. Shearin; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 343-347. 1950.

This paper describes the general location and extent of the Dismal Swamp, its vegetation, previous soil investigations in the area, and

results obtained in investigations made by the author between 1946 and 1949 in connection with the soil survey of that county.

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DARK-CLAY SOILS OF WARM REGIONS VARIOUSLY CALLED RENDZINA, BLACK COTTON SOILS, REGUR, AND TIRS.

By Harvey Oakes and James Thorp; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 347-354. 1950.

A summary of the characteristics of the dark-clay soils of warm regions is made from a partial review of the literature.

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THE RATE OF RESPIRATION OF JACK PINE ROOT TIPS AS INFLUENCED BY EXTRACTS FROM DIFFERENT TYPES OF HUMUS.

By Andre Lafond; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 357-359. 1950.

In this study the influence of water extracts from different types of forest humus on the respiratory processes of jack pine root tips was observed, using manometric techniques.

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CRYPTO-MULL HUMUS: ITS PROPERTIES AND GROWTH EFFECTS (A CONTRIBUTION TO THE CLASSIFICATION OF FOREST HUMUS).

By S. A. Wilde; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 360-362. 1950.

The term "crypto-mull" is intended to designate the surface horizons of those forest soils whose natural biological processes cause a rapid and nearly complete breakdown of forest litter which leaves little or no dark colored by-products of decomposition to infiltrate into the mineral soil. The visible organic fraction of crypto-mull consists largely of a sporadic surface cover of undecomposed or partly disintegrated leaves and other plant remains (A_0). The horizon with incorporated humus (A_1) has an extremely shallow depth of less than 1 inch, and is not always discernible by ocular examination. Although the morphology of crypto-mull is simplicity itself, there is more than meets the eye in this type of humus. The content of organic matter and total nitrogen in the surface 4-inch layer of soil at times reach the high levels of 7.5 and 0.3 percent, respectively. In spite of their barren appearance, some soils with crypto-mull humus support hardwood stands of exceptionally high rates of growth and total yields.

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PRAIRIE-LIKE MULL HUMUS, ITS PHYSICO-CHEMICAL

AND MICROBIOLOGICAL PROPERTIES (A CONTRIBUTION TO THE CLASSIFICATION OF FOREST HUMUS).

By R.S. Pierce; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 363-364. 1950.

This paper reports results of a detailed study of the most conspicuous humus forms of the prairie-forest region. This form is distinguished by the enormous depth of the horizon with incorporated organic matter which approaches 2 feet, and is tentatively termed "prairie-like mull."

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PRELIMINARY REPORT ON MINERAL DEFICIENCIES IN DOUGLAS-FIR AND WESTERN RED CEDAR.

By Stanley P. Gessel, Richard B. Walker, and Philip G. Haddock; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 364-369. 1950.

Preliminary experiments on the mineral nutrition of certain Pacific Northwest forest tree species resulted in the following: a. The needs of the species investigated for the usual macro nutrients were verified. b. Characteristic deficiency symptoms for some elements were noted. c. Field fertilization of young stands of Douglas-fir corrected deficiency symptoms and increased nitrogen content of foliage. Phosphorus content of foliage. Phosphorus content was not affected during the first season. d. Romaine lettuce plants grown on two forest soils showed very striking response to phosphorus fertilization. Nitrogen response was correlated with the support of good or poor growth of Douglas-fir under forest conditions. e. Nitrogen content of foliage from trees making poor growth and exhibiting deficiency symptoms tends to be lower than in trees growing more rapidly. Calcium content of western red cedar foliage in higher than Douglas-fir, and older fir needles have a higher calcium content than current growth.

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POTASSIUM DEFICIENCY OF REFORESTED PINE AND SPRUCE STANDS IN NORTHERN NEW YORK.

By Svend O. Heiberg and Donald P. White; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 369-376. 1950.

Starvation of young coniferous plantations of *Pinus resinosa*, *Pinus strobus*, *Picea abies*, and *Picea glauca* was observed on sandy soils developed on a terrace of glacial outwash in the outskirts of the Adirondack Mountains in New York State. The forest was cleared for agricultural crops and grazing during the period 1800-1850. Fairly intensive agricultural use continued until about 1925. Deficiency symptoms include: 1. General chlorosis followed by browning and finally dying of the needles: 2. Decreased height

and diameter growth; 3. Decrease in the number of years that the needles persist on the trees; 4. Shortening of the needles.

Soil mulches of logging debris and forest humus as well as applications of complete commercial fertilizer produced a strong growth response, whereas a glass wool mulch gave no growth response. Applications of CaO , NaNO_3 , $(\text{NH}_4)_2\text{SO}_4$, $\text{Ca}_3(\text{PO}_4)_2$, and KCL as pure chemical salts in May 1943 and 1946 on *Pinus resinosa* plots resulted in a strong growth response to the KCL only, with a mild response to the NaNO_3 . Subsequent fertilization of symptomatically deficient coniferous plantations including *Pinus strobus*, *Picea abies*, and *Picea glauca* resulted in a pronounced response of all to potash fertilization even at the end of one growing season.

EFFECT OF ORIGIN AND GROWTH CONDITIONS OF NORWAY SPRUCE (*PICEA EXCELSA*) ON THE CHEMICAL COMPOSITION OF SEED AND PHYSIOLOGICAL CHARACTERISTICS OF NURSERY STOCK.

By C. T. Youngberg; Soil Sci. Soc. of Amer. Proc. Vol. 15, pp. 376-379. 1950.

This study aimed to detect the differences in seed composition brought about by the state of soil fertility.

AN IMPROVED METHOD FOR DETERMINING THE WATER PERMEABILITY OF FOREST SOILS.

By E. C. Steinbrenner; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 379-381. 1950.

The procedure reported in this paper first of all aims to minimize the disturbance of soil in sampling.

LIMING AND TWENTY YEARS OF LITTER RAKING AND BURNING UNDER RED (AND WHITE) PINE.

By Herbert A. Lunt; Soil Sci. Soc. of Amer. Proc. Vol. 15, pp. 381-390. 1950.

On a series of six 1/40-acre plots in a red pine plantation on Merrimac loamy sand, the annual litter removal by raking was compared over a period of 19 years with annual litter burning and with undisturbed litter, with and without liming. A similar series under white pine was destroyed by the 1938 hurricane after 9 years of treatment. On a seventh red pine plot the natural forest floor was supplemented with litter from the two red pine raked plots.

The work indicates that under the conditions of the investigation, raking had a small but de-

finite detrimental effect on certain properties of the soil and on tree growth. On the other hand burning, liming, and the application of additional litter all had a favorable effect on certain aspects of the soil and upon tree growth. It is believed, however, that annual burning, if continued over a long period of time, would ultimately have an adverse effect on stand growth and character.

RAPID METHOD FOR DETERMINING SOIL MOISTURE.

By R. E. Uhland; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 391-393. 1950.

The volume weights of some soils change but little during the year. The moisture content of these soils in percent by volume is equal to the weight of the wet sample in grams minus the weight of the oven-dry sample in grams, divided by the volume of the sample in cubic centimeters times 100. If the 3- by 3-inch cylinders are used, the soil core volume is 347 cubic centimeters. By multiplying the depth of soil in inches that is represented by each set of cores by the percent of moisture, the number of inches of moisture contained in that portion of the soil profile is obtained.

The following equations are used for determining the amount of water in the field soil and in the soil when saturated:

$$(1) \frac{FW - ODW^2}{\text{Volume}} = \text{percent moisture by volume}$$

Percent Volume x Depth of soil (inches)
= Depth of water in inches.

$$(2) \frac{SW - ODW^2}{\text{Volume}} = \text{Percent moisture by volume}$$

Percent Volume x Depth of Soil (inches)
= Depth of water in inches.

A SUMMARY OF DATA ON SOIL AND AIR TEMPERATURES AT THE NORTH APPALACHIAN EXPERIMENTAL WATERSHED, COSHOCTON, OHIO.

By F. R. Dreibelbis; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 394-399. 1950.

Maximum and minimum soil and air temperatures are presented for the period 1942-1949 representing a watershed in a four-year rotation consisting of corn, wheat and 2 years meadow. Similar data for a woodland watershed for the years 1945 and 1949 are also given. The soil temperatures were measured at depths of 1/2-inch, 3-inch, 6-inch, 12-inch and 24-inch. Air temperatures were obtained at 2-inch and 30-inch heights. The soil temperature fluctuations at the 1/2-inch depth respond closely to those of the air temperatures. As soil depth increases,

temperature fluctuations decrease. The annual range of soil temperature in the woodland is narrower than in a 4-year rotation watershed because of insulating and other effects of woodland cover. In summer soil temperatures are lower in the woodland than in the rotation watershed while in winter they are higher. Hourly soil temperatures were presented for July 1, 2, and 3, 1948, and the lag increased with soil depth.

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SOIL AGGREGATION, ORGANIC MATTER, AND YIELDS IN A LONG-TIME EXPERIMENT AS AFFECTED BY CROP MANAGEMENT.

By C. H. M. van Bavel and F. W. Schaller; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 399-404. 1950.

Data are presented from a study initiated in 1931 on the effect of different cropping systems on soil and water losses on Marshall soil located at Clarinda, Iowa. Data on soil and water losses, aggregation, organic matter content, and corn yields obtained during the period 1942-49 are reported and discussed in relation to earlier data.

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INTAKE OF WATER BY CLAYPAN SOILS.

By Paul E. Fischbach and F. L. Duley; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 404-408. 1950.

This report discusses tests made in an attempt to measure the effect of claypan in the subsoil on penetration of water through the soil profile.

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WATER CONSERVATION FOR WHEAT PRODUCTION IN OKLAHOMA.

By Harley A. Daniel; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 408-412. 1950.

Methods of water conservation, fertility improvement, and cropping systems must be developed in harmony with natural conditions.

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EFFECT OF CONTOUR FARMING ON SOIL LOSS AND RUN-OFF.

By C. A. Van Doren, R. S. Stauffer, and E. H. Kidder; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 413-417. 1950.

This paper reports 9 years results on the effectiveness of contour farming on a productive Corn Belt soil. In addition to surface runoff

and soil loss by erosion, the authors present a preliminary report on tile flow and plant nutrient losses in the tile drainage.

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TESTS OF SMALL CORE SAMPLERS FOR PERMEABILITY DETERMINATIONS.

By T. W. Edminster, W. L. Turner, Jr., J. H. Lillard, and Forrest Steele; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 417-420. 1950.

The results of the initial tests of the two sizes of permeability cores and two methods of sampling indicated that there are significant differences in the results obtained from the two types of cylinders.

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PERMEABILITY AND LAND CLASSIFICATION FOR SOIL AND WATER CONSERVATION.

By R. E. Devereux, Forrest Steele, and Walter L. Turner, Jr.; Soil Sci. Soc. of Amer. Proc., Vol. 15, pp. 420-423. 1950.

This paper reports progress on the work done in Virginia in an effort to learn more about the permeability of different soil mapping units and make practical use of the information. A few examples of application to specific field problems throughout the field of soil and water conservation and flood control are given as illustrations of the need for accurate information on soil permeability at the time and place of field operations.

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THE NEED FOR COVER CROPS IN CORN BELT AGRICULTURE.

By J. J. Pierre; Jour. Soil and Water Conservation, Vol. 6, No. 3, pp. 121-124 and 154. July 1951.

Cover crops reduce soil, plant nutrient, and water losses. They are needed in the corn belt because soil deterioration and erosion losses are very serious on many uncovered sloping fields throughout the area. The clean tilled acreage from the corn belt as a whole is proportionately too high in ratio to the acreage in meadow crops. Better rotations are needed. Cover crops will not replace good rotations but they can be considered as another cog in the wheel to help prevent the depletion of soil resources.

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SOIL CONSERVATION SURVEYS TO DO THE JOB.

By Joseph H. Winsor; Jour. Soil and Water Con., Vol. 6, No. 3, pp. 125-128 and 145. July 1951.

This paper is based on the fact that individuals, industrial concerns and governmental bodies are requesting help in solving their special land-use and management problems. The author believes that soil conservation surveys should be tailored to meet these needs. This would be in addition to their use in farm planning for soil and water conservation.

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PHYSICAL CHARACTERISTICS OF SOILS RELATED TO EROSION.

By Henry W. Anderson; Jour. Soil and Water Con., Vol. 6, No. 3, pp. 129-133. July 1951.

Land management decisions involving the location of erosion sources and control of erosion can be made more soundly when they are based on determination and quantitative evaluation of the principal causes of erosion. The characteristics of soil itself is an important cause. Soil effects on erosion can be separated from other effects by making physical analyses on relatively few soil samples and by application of suitable analytical technique.

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PRINCIPLES AND PRACTICES OF BENCH TERRACING IN PUERTO RICO.

By Jose Vicente-Chandler and R. M. Smith; Jour. Soil and Water Con., Vol. 6, No. 3, pp. 134-145. July 1951.

The use of bench terraces for controlling erosion and increasing production is a complex practice requiring careful study and planning on the part of technicians, and interest and care on the part of the farmers. This paper discusses some of the problems involved in the construction and use of bench terraces.

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THE GRASSLANDS PROGRAM IN THE NATIONAL EMERGENCY.

By W. M. Myers; Amer. Plant Food Council, Inc. Jour., Vol. 5, No. 1, pp. 2-5. January-February-March, 1951.

Improved grasslands provide the most economical source of feed for livestock and the most effective means of preventing erosion, preserving and improving soil fertility. A grassland program can make far reaching contributions to the national welfare thru increased supplies of food, feed, and fiber, and especially, thru increased amounts of livestock products while maintaining the nation's production plant for use by future generations.

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THE EFFECT OF CHEMICAL FERTILIZERS ON SOILS, CROP QUALITY AND YIELDS.

By Emil Truog; Amer. Plant Food Council, Inc. Jour., Vol. 5, No. 1, pp. 6-9. January-February-March 1951.

This is a review of the effects of applications of chemical fertilizers on the soils as well as the quantity and nutritive quality of crops produced thereon.

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IMPORTANCE OF CHEMICAL FERTILIZERS IN SOUTHERN FARMING.

By Ralph W. Cummings; Amer. Plant Food Council, Inc., Jour. Vol. 5, No. 1, pp. 10-13. January-February-March 1951.

This is a discussion of the importance of chemical fertilizers in farming operations in the south.

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LAND RESOURCES AND RECOMMENDED CONSERVATION PRACTICES IN NEBRASKA.

By Frank Miller and Arthur Anderson; Neb. Agr. Exp. Sta. Bul. 395. November 1949.

The major purpose in preparing this publication was to point out the need for soil conservation in Nebraska, to bring together some of the important information that has a direct bearing upon conservation problems, and to examine the effects of applying current recommendations upon the present organization of farms.

The material presented explains the factors used in classifying land according to its use suitability. The land inventory of the State based upon this classification is the foundation of the study. The soil conserving practices recommended for each land class are outlined. The ten major areas are divided into crop adjustment sections where soils, rainfall, length of growing season and cropping practices are comparatively uniform. The land inventory in each section is presented and some of the most intensive of the crop rotations recommended for the different classes of land in the various crop adjustment sections are applied. The acreages of crops that would result from the use of the recommended rotations are compared with the 1942 acreages in order to appraise the possible effects of these recommendations upon farm organization and sources of income.

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EFFECT OF STUBBLE MULCHING ON NUMBER AND ACTIVITY OF EARTHWORMS.

By S. P. Teotia, F. L. Duley and T. M. McCalla;

Neb. Agr. Exp. Sta. Research Bul. 165. Sept. 1950.

A survey of earthworm population under different cropping systems was made under stubble mulch farming and where the residue was plowed under. The influence of earthworms on some of the important physical and biological properties of the soil was studied. Their role in the decomposition of crop residues was also determined.

In the surface 8 inches of soil stubble mulched plots contained two to five times as many earthworms as plots in which the residue was plowed under.

In straw mulched plots, earthworm population increased with the rate of straw application. Population was highest in plots where straw mulch was applied at the rate of 8 tons per acre.

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CHEMICAL CONTROL OF MESQUITE.

By A. H. Walker; Sheep & Goat Raiser, Vol. 31, No. 7, pp. 22-23. April 1951.

This is a discussion of the use of several of the most promising chemicals in connection with the control of mesquite.

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NEW TYPE OF RANGE SEEDER.

Sheep and Goat Raiser, Vol. 31, No. 7, p. 48. April 1951.

A range seeder is described which fastens under a cow's neck like a cowbell. The device is said to drop one to three seeds everytime a cow lowers its head to graze, which is about 20 to 30 times per minute while grazing.

This range seeder will hold seed for a week or more before it is necessary to refill it. The seeder is a unique foolproof mechanical device. By the movement of the cow itself, the seeds are agitated mechanically so that they will not cake on the bottom of the seeder. There are two flat disks one above the other. As the cow raises or lowers its head, holes in the movable disks match up and drop out the seed. The seeder will use almost any kind of seed.

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AIRCRAFT IN AGRICULTURE.

By N. E. Shafer, J. D. Furrer, and J. W. Lomax; Neb. Agr. Exp. Sta. Cir. 88. September 1950.

This is a review of the part aircraft has played in agriculture together with suggested additional uses in the future.

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SYSTEMS OF FARMING FOR THE TRI-COUNTY IRRIGATION AREA IN NEBRASKA.

By T. S. Thorfinnson and A. W. Epp; Neb. Agr. Exp. Sta. Bul. 393. January 1949.

A study of irrigated farming in the Tri-County area of Nebraska was undertaken in 1945. The first part of the study dealt primarily with the development of the irrigation project and the adjustments made by farmers in an established farming area with a subhumid climate when shifting from dry-land agriculture to irrigated farming. The second part of the study, begun in 1946 and covered by this report, sought primarily to determine some of the systems of farming suitable to conditions in the area. Other purposes involved an appraisal of the net economic benefits of irrigation water on each farm and appraisal of the net economic benefits of irrigation water on each farm and appraisal of the extent to which farming developments in the Tri-County area may apply to other subhumid areas of the Great Plains where irrigation is contemplated

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A GRAPHIC METHOD OF FINDING THE DEPTH OF IRRIGATION WATER APPLIED.

By James E. Garton; Okla. Agr. Exp. Sta. Bul. No. B-368. April 1951.

An easy method of explaining how to compute the depth of irrigation water which has been applied is sometimes needed. This bulletin presents a nomograph developed to meet that need.

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RESULTS FROM LONG-TIME FIELD EXPERIMENTS ON HILLSDALE SOIL.

By A. G. Weidemann and C. E. Millar; Mich. Agr. Exp. Sta. Special Bul. 366. January 1951.

The bulletin reports the results of experiments dealing with fertilizer placement and rates of application; storage, reenforcement and rates of application of manure; cropping systems; green manuring; time and depth of plowing; and other tillage practices.

Many of the experiments cover a period from about 1932 to 1948 although some are of shorter duration. The studies were carried out on Hillsdale soil which, together with soils having similar characteristics, constitutes a large acreage in the central and southern part of the lower peninsula of Michigan.

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FERTILIZING THE CORN CROP IN WISCONSIN.

By C. J. Chapman; Better Crops with Plant Food,

This article expresses the belief that the average yield of corn in Wisconsin could be doubled if all of the corn acreage were given the proper soil and fertilizer treatment, the stands were stepped up to safe limits and adapted strains of good hybrids were planted. Results of specific tests are given as illustrations of how this can be accomplished.

INCREASING COTTON YIELDS IN NORTH CAROLINA.

By C. D. Welch and W. L. Nelson; Better Crops with Plant Food, Vol. 35, No. 3, pp. 11-14 and 43-44. March 1951.

From 40 to 80 pounds of nitrogen per acre are needed on the average cotton soils in North Carolina to produce 1.5 to 2 bales of cotton. Nitrogen applications should be reduced on dark soils. Following a good growth of a leguminous cover crop, cotton may require little if any nitrogen fertilizer. The response to nitrogen is complicated by insect injury and a good system of insect control is necessary in order to obtain greater returns from high fertilization. An early set of bolls is essential in obtaining profitable returns from the fertilizer, and early insect control is important.

From 50 to 100 pounds of P_2O_5 per acre and from 30 to 80 pounds of K_2O per acre are needed, the amounts needed depending upon the levels of these nutrients in the soil.

The soil reaction should be maintained at pH 6.0 to 6.5 by suitable applications of dolomitic limestone.

KNOW YOUR SOIL: VIII. PENN SILT LOAM.

By J. B. Hester, F. A. Shelton and R. L. Isaacs, Jr.; Better Crops with Plant Food, Vol. 35, No. 3, pp. 13-17, and 48. March 1951.

The Penn series is one of the important soils of the Piedmont Plateau which lies slightly west of the Coastal Plain and extends from southeastern New York to Alabama. It is derived primarily from ancient crystalline rock. This soil in its native state of development is low in fertility. The soil reaction or pH value is below 5.5. The organic matter content is low and the plant nutrients, particularly calcium and magnesium, are insufficient to supply the crops that are valuable for animals.

Practically all plants have different nutritional requirements. All soils differ in the physical and nutritional status. Millions of acres of Penn silt loam or related soils that are

unproductive can be brought into efficient and maximum production by correcting the limiting factors.

A LOOK AT ALFALFA PRODUCTION IN THE NORTHEAST.

By J. B. Washko; Better Crops with Plant Food, Vol. 35, No. 3, pp. 18-22 and 46-48. March 1951.

This is a discussion of the problems confronting the alfalfa grower in the northeast and how they can be overcome.

HYBRID CORN YIELD TESTS - 1950.

By W. J. Wiser; Ark. Agr. Exp. Sta. Report Series 23. February 1951.

This is a report on corn performance tests conducted at Fayetteville, Marianna, Clarkedale, Batesville, Stuttgart, Hope and in Craighead County, Arkansas in 1950. Outstanding results were obtained with hybrid varieties.

MECHANIZED PRODUCTION OF COTTON.

By D. A. Hinkle, W. F. Buchele, and H. S. Stanton; Ark. Agr. Exp. Sta. Rpt. Series No. 22. February 1951.

This is a progress report on the various mechanical and chemical operations which are being studied in cotton mechanization at Marianna and Clarkedale during the period 1947 through 1950.

WHAT ABOUT LIQUID FERTILIZERS?

By G. W. Volk, J. H. Wilson and J. L. Haynes; Ohio Agr. Exp. Sta., Farm and Home Research, Vol. 36, No. 268, pp. 8-9. January-February 1951.

This article outlines principles of fertilization that have a bearing on the practice of treating seed with liquid fertilizer and describes results of recent tests involving this type of treatment. None of the tests showed any evidence of benefit to crop response either in the form of visible improvement in seedling growth or in the form of increased crop yield from the use of liquid fertilizer for pre-planting treatment of seed.

SUCCESS OR FAILURE WITH BAND SEEDED LEGUMES?

By J. L. Haynes and L. E. Thatcher; Ohio Agr.

Exp. Sta. Farm and Home Research, Vol. 36, No. 268, pp. 3-4. January-February 1951.

This article describes a "band seeding method" of legumes. The legume and grass seeds are concentrated above drill rows of fertilizer. Properly done, this method results in legume seedlings that grow faster and establish themselves earlier than comparable broadcast seedings. Due to reduced seedling mortality, less seed is required for good stands with the band method than is required with broadcast seeding methods. Current experience with the band seeding method and gives suggestions for improved mechanical arrangements for making band seedings are set forth.

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THE SILTING OF RIDGE LAKE.

By J. B. Stall, L. C. Gottschalk, A. A. Klingebiel, E. L. Sauer and S. W. Melsted; Ill. State Water Survey Div., Rpt. of Investigation No. 7. 1951.

This is a report of a silt survey of Ridge Lake, a small recreation lake built in 1941, located at Fox Ridge State Park near Charleston, Ill. The lake has a drainage area of 902 acres; original lake area was 18.1 acres and original volume was 187 acre-feet. The survey shows a capacity loss of 1.29 percent per year. In the 6.4-year life of the lake, sediment has destroyed 8.3 percent of the original capacity. The lake has suffered an average annual loss of 120 cubic feet. The watershed has contributed an average of 4.4 tons of sediment per acre annually. The lake sediment contains a high level of available potassium and phosphorus indicating a relatively high fertility of the eroding soils.

A large part of the sediment originates on the Hennepin gravelly loam which covers 33.5 percent of the watershed area. About 85 percent of the material eroded originates in woodland areas. Erosion is proceeding approximately three times as fast on the steep woodland as on the level upland.

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SOIL PERMEABILITY DETERMINATIONS FOR USE IN SOIL AND WATER CONSERVATION.

By R. E. Uhland and Alfred M. O'Neal; SCS-TP-101, Washington, D. C. January 1951.

This paper describes the equipment and procedure for taking soil core samples and tells how these samples can be analyzed to judge their permeability by means of subsoil characteristics.

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FERTILIZER RECOMMENDATIONS FOR KANSAS.

By H. E. Myers and F. W. Smith; Kan. Agr. Exp. Sta. Cir. 264. September 1950.

This is a discussion of the fertilizer needs and practices by crops in Kansas.

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SOIL FERTILITY INVESTIGATIONS AT COLUMBUS EXPERIMENT FIELD, 1924-49.

By F. E. Davidson and F. W. Smith; Kan. Agr. Exp. Sta. Bul. 343. September 1950.

Results of soil fertility investigations conducted at the Columbus Experiment Field are summarized in this bulletin for the period 1924 to 1949, inclusive.

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CHEMICAL CONTROL OF BRUSH.

By W. C. Elder and James Gassaway; Okla. Agr. Exp. Sta. Mimeo. Cir. M-218. April 1951.

This publication reports the progress of research on brush control with chemicals. Many of the methods used, and chemicals tested, have given encouraging results. Final conclusions cannot be made on many of these tests, because it will take several years for the chemicals to show full effect on the woody plants found in brush cover.

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CORN FERTILIZER STUDIES NEAR COLLEGE STATION, 1949-50.

By J. C. Smith, J. S. Rogers, J. F. Fudge and J. E. Roberts; Tex. Agr. Exp. Sta. Prog. Rpt. 1339. March 8, 1951.

Results of four experiments with corn grown on bottomland Norwood silty clay loam over a 2-year period may be summarized as follows:

Nitrogen was the only fertilizer component which increased yields.

Where corn followed corn, maximum yields were obtained with 60 pounds of nitrogen in 1949 when lack of moisture limited production, and with 120 pounds in 1950 when moisture was not a limiting factor.

Where corn followed alfalfa, 30 pounds of nitrogen per acre produced maximum yields.

With plant spacings of 12, 18 or 24 inches, no significant differences in yields of corn were obtained; yields with 30-inch spacing were definitely lower than those with closer spacing.

Yields of Texas 24 hybrid corn averaged 22.6 percent higher than those of open-pollinated

Surcropper.

In 1949, with corn grown on bottomland Norwood silt loam following cotton, highly significant increases in yield resulted from the application of 90 pounds of nitrogen and 30 pounds of phosphoric acid.

In 1950, with corn grown on upland Crockett fine sandy loam, highly significant increases in yield resulted from the application of 90 pounds of nitrogen and 30 pounds each of phosphoric acid and potash per acre.

WATER CONSERVATION INCREASES COTTON YIELDS.

By C. E. Fisher and P. T. Marion; Tex. Agr. Exp. Sta. Prog. Rpt. 1340. March 11, 1951.

Long-time water and soil conservation studies show that yields of cotton have been substantially increased by contouring and terracing relatively level clay loam soils of the Rolling Plains of West Texas. These practices increased water retention and caused deeper penetration of moisture in the soil; they reduced soil erosion and decreased the likelihood of poor crops and failures in dry years.

This report covers experimental work begun at the Spur station in 1927 on field areas having: rows with the slope, contour rows, and contour rows and closed level terraces. The three field areas have been planted continuously to cotton for 24 years. The soils are largely Abilene clay loam and are considered fertile but drouthy. The slope of the land averages 0.5 percent.

Measurements obtained include yield of cotton, inches of runoff and soil moisture content 3 to 6 feet deep at monthly intervals during the growing season. No measurement was made to soil losses on the field areas.

SUPPLY PHOSPHORUS TO RANGE CATTLE THROUGH THE FERTILIZATION OF RANGE LAND.

By E. B. Reynolds, J. F. Fudge and J. M. Jones; Tex. Agr. Exp. Sta. Prog. Rpt. 1341. March 12, 1951.

Fertilizer work with phosphates was started on the King Ranch in the spring of 1941 to determine whether the application of phosphates to grazing lands would increase the yield and phosphorus content of range grasses, and whether the fertilized grasses would provide adequate amounts of phosphorus for range cattle grazing them. The results obtained during the 6 years, 1941-46, show that the application of phosphate increased the yield and phosphorus content of the range forage and provided sufficient phos-

phorus for range cattle, except during periods of severe drouth.

REFERENCE POINTS OF SOIL MOISTURE ESSENTIAL IN SCIENTIFIC IRRIGATION PRACTICE.

By Ernesto L. Rigor; The Philippine Soc. of Agr. Eng., Agr. Eng. Jour., Vol. 1, No. 1, pp. 24 and 26. First Quarter. 1950.

This is a discussion of the reference points of soil moisture. From the viewpoint of plant growth the field capacity and permanent wilting percentage which represent the limits of available water are now generally accepted as the reference points of soil moisture essential in sound irrigation.

FERTILIZER REQUIREMENTS FOR RICE FOLLOWING IMPROVED AND UNIMPROVED PASTURES.

By R. H. Wyche, R. L. Cheaney, R. M. Weihing and James B. Moncrief; Tex. Agr. Exp. Sta. Prog. Rpt. 1335. March 5, 1951.

Experiments were conducted in 1950 to compare rice yields and fertilizer requirements following improved and unimproved pastures. The unfertilized plots produced an average yield of 17.72 barrels of rice per acre following improved pasture for 3 years, as compared with 15.23 barrels where rice was grown in alternate years.

Nitrogen increased the yield of rice following both improved and unimproved pastures. Under both conditions, the yields increased as the rate to nitrogen was increased. However, the data indicated that 80 pounds of nitrogen per acre was the most profitable rate to use.

The increase in yield produced by 80 pounds of nitrogen per acre was approximately the same following both the improved and unimproved pastures. This increase was 5.45 barrels per acre where rice followed 3 years of improved pasture, and 5.94 barrels where rice was grown in alternate years.

YIELDS OF RICE AS AFFECTED BY DIFFERENT NITROGENOUS FERTILIZERS, LIME AND PHOSPHORIC ACID, 1949-50.

By R. H. Wyche and R. L. Cheaney; Tex. Agr. Exp. Sta. Prog. Rpt. 1347. April 2, 1951.

Urea, Cyanamid and sulphate of ammonia were significantly superior to the other materials used as sources of nitrogen for rice during 1949-50 near Beaumont. Eighty pounds of nitrogen from each of these materials increased the yield

of rice by approximately 5.5 barrels per acre. The addition of 80 pounds of phosphoric acid to the nitrogen caused an additional increase of approximately 3 barrels per acre. Lime did not affect the yield of rice.

The average yield of rice from plots near Bay City in 1950 which received 80 pounds of nitrogen but no superphosphate was 3.59 barrels per acre more than where no fertilizer was used. The addition of 40 pounds of phosphoric acid per acre further increased the average yield by 5.31 barrels. Yields with 80 pounds of phosphoric acid were not significantly higher than those with 40 pounds. Urea, cyanamid and sulphate of ammonia were again significantly superior to the other materials used in the test.

FERTILIZER REQUIREMENTS FOR RICE ON THE SOILS OF THE GULF COAST PRAIRIE OF TEXAS, 1947-50.

By R. L. Cheaney and R. H. Wyche; Tex. Agr. Exp. Sta. Prog. Rpt. 1348. April 2, 1951.

Experiments with fertilizers for rice have been conducted for the past few years on outlying farms and on areas representing each of the principal soil types that are used for growing rice in the Gulf Coast Prairie of Texas. The soils are Beaumont clay, Lake Charles clay, Lake Charles clay loam, Katy fine sandy loam, Hockley fine sandy loam and Edna fine sandy loam. It is estimated that these soil types make up more than 80 percent of the rice land in the Texas rice belt. Brief descriptions of each soil and the areas in which it is of major importance are given with the discussion of the results.

THE EFFICIENCY OF FERTILIZER APPLICATIONS ON DRY, WET AND FLOODED SOILS, AS MEASURED BY RICE YIELDS.

By R. H. Wyche and R. L. Cheaney; Tex. Agr. Exp. Sta. Prog. Rpt. 1355. April 6, 1951.

The average yields for 1949 and 1950, show that nitrogen fertilization resulted in highly significant increases in yield in all cases, but the degree of response to fertilization differed significantly with differences in soil moisture conditions at the time the fertilizer was applied. All fertilizer treatments applied on dry soil produced higher yields than the same treatments applied on either wet or flooded soils. The application of 60 pounds of nitrogen increased the yield by 3.83 barrels when applied to a dry soil, but by only 0.99 barrel when applied to a flooded soil. The yield with 60 pounds of nitrogen applied to a dry soil was 1.10 barrels greater than the yield with 100 pounds of nitrogen applied to a flooded soil. Yields when the fertilizer was applied to wet

soils were lower than those with the dry soil, but higher than those with the flooded soil.

EFFECT OF TIME OF APPLICATION OF VARIOUS FERTILIZERS ON THE YIELD OF RICE VARIETIES OF DIFFERENT MATURITY, 1949-50.

By R. L. Cheaney, R. H. Wyche and H. M. Beachell; Tex. Agr. Exp. Sta. Prog. Rpt. 1362. April 16, 1951.

A series of experiments, involving time of application of fertilizers which supplied nitrogen alone (80-0-0), or a combination of nitrogen and phosphoric acid (90-40-0), and split applications of an 80-40-0 fertilizer to early, mid-season and late maturing varieties of rice, prompt the following conclusions:

If early or mid-season varieties are to be grown on clean land, relatively free from weeds and grass, all of the fertilizer should be applied at the time of planting, or half of the fertilizer should be applied at planting and the remainder as a top-dressing 20 to 40 days later.

If early or mid-season varieties are to be planted on areas where grass and weeds may become a problem, all of the fertilizer should be applied as a top-dressing about 35 to 40 days after planting.

If late varieties are to be grown, all of the fertilizer should be applied as a top-dressing about 35 to 40 days after planting.

THE EFFECT OF WASTE SULPHITE LIQUOR SOLIDS ON THE CHEMICAL AND PHYSICAL PROPERTIES OF SOIL.

By F. J. Sowden and H. J. Atkinson; Sci. Agr., Vol. 31, No. 3, pp. 93-98. March 1951.

A laboratory experiment was conducted to determine the effect of repeated additions of waste sulphite liquor solids and manure on the chemical and physical properties of a clay and a sandy soil. Four applications of each treatment were made over a period of two years.

The W.S.L.S. treatment decreased the pH while the manure treatment increased it. There was an increase in the content of organic carbon and loss of an ignition percentage by both treatments. The manure treatment increased the Uronic carbon and lignin content of both soils, whereas the W.S.L.S. had a lesser effect on these constituents. The organic fraction which was most affected by the addition of W.S.L.S. was the fraction soluble in hotwater.

The addition of W.S.L.S. increased the size of

the water-stable aggregates; this effect seemed to be a direct one and not the result of some compounds formed by bacterial or chemical action.

The moisture equivalent of the sandy soil was increased by both the W.S.L.S. and manure treatments, but there was little effect on this property in the case of the clay soil.

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TRACTOR-MOUNTED FOUR-ROW PLOT SEEDER.

By A. I. Magee; Sci. Agr., Vol. 31, No. 3, pp. 120-122. March 1951.

A tractor-mounted four-row plot seeder, using Kemp "V" belt type seeding units, has been developed and described.

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THE EFFECT OF CIRCULAR PERFORATIONS ON FLOW INTO SUBSURFACE DRAIN TUBES.

By Don Kirkham and G. O. Schwab; Agr. Eng., Vol. 32, No. 4, pp. 211-214. April 1951.

This paper analyzes the effect of circular perforations on drain-tube performance, the assumption being made that the soil both around the drain tube, and at distances removed from it, is of uniform permeability.

In solving the problems the procedure is as follows: (a) A theory based on Darcy's Law is obtained for the flow; (b) using electric-analogue model experiments, the theory is spot-checked; (c) with the theory established the mathematical formulas which have been developed under (a) are used with confidence to calculate the effect of a wide range of sizes and spacings of perforations and of sizes and depths of drain tubes.

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SAVE OUR SOIL.

By Leonard D. Nesbitt; Alberta Wheat Pool, Calgary, Canada. 1950.

Most of the material in this booklet has been gleaned from writings and speeches of authorities on soil erosion. It is hoped that this publication will be of assistance in awakening interest and creating action in preventing land devastation.

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AN ECONOMIC STUDY OF LAND SETTLEMENT IN REPRESENTATIVE PIONEER AREAS OF NORTHERN SASKATCHEWAN.

By R. A. Stutt and H. Van Vliet; Dominion of

Canada, Department of Agr., Pub. No. 767, Tech. Bul. No. 52. June 1945.

This study presents a picture of economic and living conditions in the pioneer areas of northern Saskatchewan. Such a study is particularly timely and useful. More than any other, it is a section of the province where farming exhibits peculiar economic problems and where constructive governmental policies are urgently required. The large amount of detailed information assembled and analyzed in this report will be of great assistance towards a clear understanding of those factors which determine the well-being of the people located in the area in question. The bulletin is well illustrated with excellent photographs which supplement the text in an effective manner.

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RELEASE OF MINERAL MAGNESIUM AND ITS EFFECT ON GROWTH AND COMPOSITION OF SOYBEANS.

By Wm. H. Longstaff and E. R. Graham; Soil Sci., Vol. 71, No. 3, pp. 167-174. March 1951.

The purpose of this study was to investigate the release and availability of magnesium from five common magnesium-bearing minerals and to determine the effects of the magnesium made available on the growth and composition of soybean plants. It was found that plants supplied with magnesite and dolomite, not subjected to preliminary treatment, were able to utilize 45 and 66.4 percent, of the total magnesium. Available magnesium increased plant growth by 57 to 130 percent. The calcium contents of the plants increased proportionally to the uptake of magnesium.

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IODINE CONTENT OF SOME SOILS AND PLANTS IN NEW JERSEY.

By Harvey P. Newton and Stephen J. Toth; Soil Sci., Vol. 71, No. 3, pp. 175-179. March 1951.

This study was conducted to determine the iodine status of important agricultural soils of New Jersey. The surface layers of 24 important agricultural soils, and six of these soils on a profile basis, were examined for their total iodine content. Soils of the Appalachian Province averaged 5.0 ppm. and those of the Coastal Plains 2.3 ppm. iodine. The maximum iodine content of 12.1 ppm. was found in the Norton. Three soils, Squires loam and Lakewood and Sassafras sands, contained no detectable amounts. The iodine content of the soils examined was related to the nature of the parent material.

The average iodine content of plants ranged from 1.45 to 0.24 ppm. Wild carrot had the greatest iodine content, 5.16 ppm. No relation

was observed between the total iodine contents of soil and of the vegetation growing upon it.

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MOVEMENT OF WATER VAPOR IN SOILS.

By Edward L. Breazeale, W. T. McGeorge, and J. F. Breazeale; Soil Sci., Vol. 71, No. 3, pp. 181-185. March 1951.

This paper reports the results of studies on the utilization of vaporious moisture by plants. It was found that highly vegetative plants, such as tomato, can maintain turgidity and growth for an extended period with vapor as its only source of water. A technique is presented for demonstrating this phenomenon. When a supply of vaporous moisture was available the roots reduced the soil moisture well below the wilting percentage before a definite evidence of wilting appeared.

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DESCRIPTION OF MOTTELING IN SOILS.

By Roy W. Simonson; Soil Sci., Vol. 71, No. 3, pp. 187-192. March 1951.

A system is proposed for describing soil mottlings in terms of contrast, number, color, and size in ordinary field notes. It is also suggested that attention be given to boundaries and to shape or form in striking instances or in detailed morphological studies. Terms for characterizing mottled patterns are proposed together with tentative definitions of those terms. Specimen descriptions are included to illustrate use of the terminology proposed for trial and criticism.

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AN AIR ELUTRIATOR FOR DETERMINING THE DRY AGGREGATE SOIL STRUCTURE IN RELATION TO ERODIBILITY BY WIND.

By W. S. Chepil; Soil Sci., Vol. 71, No. 3, pp. 197-207. March 1951.

This study was aimed at determining the relative value of an air elutriator and a sieve in studying the dry aggregate structure of soils. It was concluded that the air elutriator had at least five major advantages over a nest of sieves for determining the dry aggregate structure of soils.

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A MODIFIED DESIGN OF THE LEES SOIL PERCOLATION APPARATUS.

By Kenneth L. Temple; Soil Sci., Vol. 71, No. 3, pp. 209-210. March 1951.

This is a description of a modified Lees percolation apparatus used in studying soil percolation.

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DETERMINATION OF TOTAL POTASSIUM AND SODIUM IN SANDY SOILS BY FLAME PHOTOMETER.

By Nathan Gammon, Jr.; Soil Sci., Vol. 71, No. 3, pp. 211-214. March 1951.

A flame photometer modification of the J. Laurence Smith procedure for total sodium and potassium in soils is outlined. Comparisons of results by the proposed method and standard gravimetric analyses on standard samples are given. The value of the modified procedure when used in analysis of soils low in total sodium and potassium is emphasized.

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SOIL MICROORGANISMS AND PLANT GROWTH SUBSTANCES: II. TRANSFORMATIONS OF CERTAIN B-VITAMINES IN SOIL. By E. L. Schmidt and Robert L. Starkey; Soil Sci., Vol. 71, No. 3, pp. 221-231. Mar. 1951. This study considered the activities of soil microorganisms in relation to the occurrence and persistence of certain B-vitamin growth substances in soil. It was concluded that microorganisms were involved in transforming certain B-vitamins in soils. Plant materials containing small amounts of vitamins were introduced into soils; action of microbial populations on these materials resulted initially in marked increases of the vitamins, followed by progressive decrease after the third day. Maximum riboflavin production occurred at the peak of microbial activity as measured by CO₂ evaluation.

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THE WATER TABLE, EQUIPOTENTIALS, AND STREAMLINES IN DRAINED LAND: VI. THE RISING WATER TABLE.

By E. C. Childs and T. O'Donnell; Soil Sci., Vol. 71, No. 3, pp. 233-237. This discussion completes the discussion, and with it this series of papers on the analogue method of solving drainage problems.

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HYDRATION OF EXCHANGEABLE CATIONS IN SILICATE MINERALS.

By A. K. Ganguly; Soil Sci., Vol. 71, No. 3, pp. 239-244. March 1951.

An attempt was made to apportion somewhat quantitatively the amount of water associated with cations, including H⁺. Evidence is presented to show that the exchangeable H ion exists as a monohydrate, namely, as K₃O⁺, a form now

considered certain in aqueous solutions.

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PROFITS FROM RELEASE OF LOBLOLLY AND SHORLEAF PINE SEEDLINGS.

By William F. Mann, Jr; Jour. of Forestry, Vol. 49, No. 4, pp. 250-253. April 1951.

Cutting low-grade hardwoods to release suppressed loblolly and shortleaf pine reproduction is a sound investment. The cost of treatment is low enough to be repaid soon by added growth of the pines, which respond quickly.

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STAND DENSITY AND THE DEVELOPMENT OF YOUNG JACK PINE.

By Paul O. Rudolf; Jour. of Forestry, Vol. 49, No. 4, pp. 254-255. April 1951.

This is a report on a study of jack pine planted in the spring of 1941 at five different spacings. At an age of 10 years, or 9 years after planting, survivals for the different spacings ranged from 87.4 to 91.2 percent, average heights from 8.4 to 8.7 feet, and average diameters breast high from 0.73 to 1.30 inches. Neither in survival nor average height were there any significant differences or trends chiefly attributable to different spacings. Average diameter at breast height, however, increased with greater spacing between trees, and this entire trend was highly significant according to an analysis of regression of spacing means.

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SOME PRINCIPLES GOVERNING THE GROWING OF REDWOOD CROPS.

By Emanuel Fritz; Jour. of Forestry, Vol. 49, No. 4, pp. 263-266. April 1951.

Once a redwood forest land owner has embarked on a program of three farming becomes interested in future crops. He will want to know what needs to be done on all his lands - virgin and cutover - to get the maximum future volume and quality of trees. It is the purpose of this paper to offer forest managers some principles and recommendations to guide them. These are based on about 30 years of observation, study, and experience in the redwood region.

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OBSERVED EFFECTS OF PRESCRIBED BURNING ON PERENNIAL GRASSES IN THE PONDEROSA PINE FORESTS.

By Harold Weaver; Jour. of Forestry, Vol. 49, No. 4, pp. 267-271. April 1951.

The author concludes that from limited observations, properly conducted prescribed burning does not seriously damage the perennial-grass forest-floor cover under ponderosa pine. In fact it appears beneficial through removal of competing vegetation and pine-needle mats. The same observation may be made with respect to grassy forest floors where periodic surface fires have continued.

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A NEW METHOD OF VOLUME REGULATION.

By George H. Burns; Jour. of Forestry, Vol. 49, No. 4, pp. 272-277. April 1951.

The author presents a direct and simple method of getting a preliminary estimate of the annual cut from forest properties. It is closely related to the age at which the stands are cut, consequently if an estimate can be made of the average cutting age during the first rotation, the actual yield obtainable at that age should furnish a good estimate of the annual cut.

The detailed procedure consists of four simple steps, i.e., (1) compute the average weighted age of the growing stock by multiplying the mid point of the age class by the area of each, and then divide the sum of the products by the total area; (2) determine the average cutting age; (3) compute the average weighted stocking as before; and (4) multiply the average weighted stocking by the normal yield.

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SOME EFFECTS OF SHEEP GRAZING ON LONGLEAF PINE.

By T. E. Maki and William F. Mann, Jr.; Jour. of Forestry, Vol. 49, No. 4, pp. 278-281. April 1951.

The open range in southern Mississippi tends to be an unfavorable environment for longleaf pine seedlings. One reason is the presence of the piney woods sheep - a nondescript off shoot of the Spanish Merino, introduced into this country some 375 years ago.

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GRAZING PREFERENCES OF CATTLE FOR CERTAIN RESEEDING GRASSES.

By H. W. Springfield and H. G. Reynolds; Jour. of Range Mgt., Vol. 4, No. 2, pp. 83-87. March 1951.

Studies conducted in the early fall of 1949 showed that grazing preferences of cattle should be considered when selecting reseeding species for the season of grazing. Succulence of forage and the time of day were the chief factors influencing cattle preferences for reseeded

grasses.

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TREATMENTS TO IMPROVE THE EMERGENCE AND STAND OF SMILG GRASS.

By Horton M. Laude; Jour. of Range Mgt., Vol. 4 No. 2, pp. 88-92. March 1951.

Methods of improving establishment of smilo grass were investigated in the greenhouse and field. Treatment of the seed prior to planting with concentrated H_2SO_4 , 71 percent H_2SO_4 , sodium hypochlorite, or clorox was studied. These treatments are described and their effect in hastening emergence and in increasing the number of seedlings emerged is reported. Greater ease of handling is suggested as an advantage of the sodium hypochlorite solutions as compared with the acid. Best results were obtained in the field using treatments of 71 percent H_2SO_4 for 20 minutes or clorox for 60 minutes.

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GRASS YIELDS OF THREE DIFFERENTLY TREATED RANGE AREAS.

By A. C. Everson; Jour. of Range Mgt., Vol. 4, No. 2, pp. 93-94. March 1951.

The purpose of this study was to determine the yield of grass on a southwestern range that was (1) cleared, reseeded and protected, (2) cleared and protected but not reseeded, and (3) untreated and open to grazing. The results indicate that brush control, reseeding and protection, or brush control and protection will increase the grass yield of deteriorated rangelands. The area that was cleared, seeded and protected four years produced eight times more grass by weight than untreated range. Eradicating the invading brush species and protecting the range from grazing greatly facilitate range recovery - more than three times as much grass was produced on the area so treated as was produced on the open range.

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SELECTIVE HERBICIDES FOR IMPROVING CALIFORNIA FOREST RANGES.

By Donald R. Cornelius and Charles A. Graham; Jour. of Range Mgt., Vol. 4, No. 2, pp. 95-100. March 1951.

This paper reports some preliminary tests with selective herbicides for control of weeds and brush on forest ranges in northeastern California. Butyl ester of 2,4-D was sprayed on mountain meadow, big sagebrush, silver sagebrush, and mamgonita brush ranges in northeastern California. Buttercup and some other meadow weeds were satisfactorily killed.

Spraying with selective herbicides offers a method of eradicating undesirable vegetation less expensive than plowing. Spraying may be used on areas too rocky or rough for plowing. Spraying keeps the erosion hazard at a minimum because much of the vegetative cover and soil structure remains intact. A satisfactory emergence of desirable forage grasses and legumes resulted from autumn seeding with the grain drill on sprayed sagebrush range and meadow.

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A ONE-MAN PORTABLE LIVESTOCK EXCLOSURE.

By John M. Fenley; Jour. of Range Mgt., Vol. 4, No. 2, pp.112-113. March 1951.

This article describes a livestock enclosure which may be assembled in 25 to 30 minutes by one man. It can be disassembled in 10 minutes and the posts carried by the man to a new location, or loaded on a pickup truck for longer hauls. Relatively few tools are required, yet the design assures a simple but substantial enclosure, capable of withstanding pressure by grazing animals.

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SOME PHYSICAL AND AGRICULTURAL CHARACTERISTICS OF THE DROUGHT AREA OF RUSSIA AND ITS CLIMATIC ANALOGUES IN THE UNITED STATES.

By M. Y. Nuttonson; Land Economics, Vol. 25, No. 4, pp. 347-364. November 1949.

On October 24, 1948, a Soviet decree was issued in reference to drought prevention and soil-water conservation practices for the greater part of the European USSR. The practices to be employed called for the establishment and development during the period 1949 to 1954 of a huge system of shelterbelts, windbreaks, grass-land agriculture, sound crop-rotation systems, proper land management and land utilization, the building of ponds and water reservoirs, and other related practices. All these individual practices are interdependent and are to be looked upon as a part of a highly complex agricultural program designed to permit a more stable and sound development of diversified farming and animal husbandry within the steppe and forest-steppe regions which cover a territory of about 780,000 square miles.

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SOIL NUTRIENTS BUILD YOUR PASTURE.

By Firman E. Bear; What's New in Crops and Soils, Vol. 3, No. 7, pp. 9-12. April-May 1951.

This article presents conclusions reached relative to pasture-management programs being practiced in New Jersey. It finally concludes that

in proportion as more grass is grown on more acres of land, the best interests of the area are served. This applies today, but it applies much more to tomorrow.

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STOCKMEN, LOOK TO THE FUTURE!

By C. Kenneth Pearse; What's New in Crops and Soils, Vol. 3, No. 7, pp. 13-17. April-May 1951.

To get the most from their efforts, and to assure their continued welfare in the future, stockmen will want to use every suitable means. These include (1) grazing only the number of livestock their ranges can support, (2) grazing the proper season, (3) using deferred and rotation systems, and (4) reseeding to tighten their operations.

All of these practices, where they can be used, will increase production, lower production costs and provide more income in good and poor years alike.

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LADINO CLOVER COMES OF AGE.

By B. A. Brown; What's New in Crops and Soils, Vol. 3, No. 7, pp. 18-19. April-May 1951.

This is a brief historical sketch of Ladino clovers rise to fame, together with the results of a few experiments and experiences with the crop in Connecticut. Ladino clover is now the best plant for pastures in the northeast.

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MODERN CLEANING PLANTS AID SEED GROWERS.

By Elvin L. Doty; What's New in Crops and Soils, Vol. 3, No. 7, pp. 20-21 and 33. April-May 1951.

This article explains how state approved seed-cleaning plants are assisting Minnesota farmers producing certified seed.

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GIANT FOXTAIL - NEW CORNBELT WEED MENAGE.

By F. W. Slife and W. O. Scott; What's New in Crops and Soils, Vol. 3, No. 7, pp. 22-23. April-May 1951.

Giant foxtail has established itself as the greatest hazard to cultivated crops on many farms in the east-central part of Illinois. Good crop rotation systems coupled with good cultural operations will help control this weed and reduce it to a minor problem instead of a major one.

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PLAN YOUR PASTURES FOR PROFITS.

By W. R. Thompson; What's New in Crops and Soils Vol. 3, No. 7, pp. 24-26. April-May 1951.

Studies conducted in Mississippi show that improved pasture will save the soil, keep it productive and make money for the farmer. The soil can be built up by growing good forage crops with well-managed pastures. A farm cannot become worn out, nor can it wash or blow away.

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THE MINERAL OF AIR AND RAIN AND ITS IMPORTANCE TO AGRICULTURE.

By C. Ingham; The Jour. of Agr. Sci., Vol. 40, Parts 1 and 2, pp. 55-61. January and April 1950.

Starting from the observation that plants can obtain all their nourishment from the air a study was undertaken to show how such elements as nitrogen, calcium and phosphorus may be derived from the air not in mere traces but in sufficient quantity to meet all the requirements of ordinary farm crops. It was concluded that: (1) Evidence, both direct and indirect has been adduced to prove that the air is sufficient both qualitatively and quantitatively to supply all the nutrition requirements of plants, independently of the soil or soil bacteria. (2) The fertility of an undisturbed soil lies chiefly in the surface inch or two is due to adsorption of plant nutrients from the air by organic and inorganic colloids, such nutrients being carried down to the roots of the growing crop by rain.

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STUDIES IN SELECTIVE WEED CONTROL: I. THE CONTROL OF ANNUAL WEEDS IN WINTER WHEAT.

By G. E. Blackman and H. A. Roberts; The Jour. of Agr. Sci., Vol. 40, Parts 1 and 2, pp. 62-64. January and April 1950.

Since 1943 numerous multifactional field experiments have been concerned with the development of methods for selective weed control in a variety of crops. Between 1943 and 1947 simultaneous comparisons have been made as to the relative effectiveness of sulphuric acid, cupric chloride, dinitro-o-cresol and the two growth-regulating substances - 2-methyl - 4-chlorophen-oxyacetic acid and 2:4-dichloro-phenoxyacetic acid - when applied as sprays (100 gal./acre) for the destruction of annual weeds in winter wheat.

There is a highly specific relationship between the weed species and the potential toxicity of any one compound. As a result of weed

erodication, increases in grain yield ranging from 6 to 113 percent have been recorded and over the twelve experiments conducted the average increase for the most appropriate treatment was 23 percent.

With the growth regulating substances, the results of two experiments indicated that the greatest selectivity is obtained when the concentration does not exceed 0.2-0.3 percent (2-3 lb./acre), but in the remaining trials no injury was observed up to a maximum concentration of 0.5 percent.

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STUDIES IN SELECTIVE WEED CONTROL: II. THE CONTROL OF ANNUAL WEEDS IN SPRING CEREALS.

By G. E. Blackman and H. A. Roberts; The Jour. of Agr. Sci., Vol. 40. Parts 1 and 2, pp. 70-81. January and April 1950.

The plan of these experiments was essentially the same as in the article immediately preceding. Spring cereals were used instead of winter wheat. The results for crop yield demonstrate that sulphoric acid and cupric chloride are less selective than dinitro-o-cresol or the substituted phenoxyacetic acids, since for equivalent degrees of weed control, smaller increases in grain production have often been recorded. These injurious effects are maximal at the higher concentrations and when spraying is delayed until after tillering is completed.

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ON THE CAPILLARY FORCES IN AN IDEALIZED SOIL.

By E. C. Allberry; The Jour. of Agr. Sci., Vol. 40, Parts 1 and 2, pp. 134-142. January and April 1950.

This paper treats of a study of the cohesive forces produced in a moist soil, by a theoretical treatment of the forces between spheres in contact, with a lenticular water drop at their junction. The force resides in the surface tension around the perimeter of the drop, and in the pressure deficiency inside it, relative to atmospheric pressure, due to its curvature. Experimental confirmation of some former conclusions are given, and the theory and verification developed to deal with the case where the spheres are not in contact, so that the work of separation decreased in earlier papers may be further considered.

The attraction between spheres, due to surface tension forces, in a lenticular drop between them is calculated for spheres in contact and at increasing separations up to the point of rupture of the drop. Hence, the work of separation of the spheres is calculated. Experimental measurements confirm the validity of these

calculations, down to very small drop sizes, where it is likely that the failure is in the experimental method. The force decreases with increasing drop size, while the separation increases.

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SEEDLING EMERGENCE AND SURVIVAL OF RANGE-GRASSES IN CENTRAL UTAH.

By Neil C. Frischknecht; Agron. Jour., Vol. 43, No. 4, pp. 177-182. April 1951.

A study of seedling emergence and survival was made of 16 grasses planted in early fall, late fall, and spring in the sagebrush and mountain brush zones in central Utah.

Percent of total emergence from early fall plantings was greater than emergence from either late fall or spring plantings. However, total surviving plants from the three seasons was about the same.

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A PORTABLE WIND TUNNEL AND DUST COLLECTOR DEVELOPED TO EVALUATE THE ERODIBILITY OF FIELD SURFACES.

By A. W. Zingg; Agron. Jour., Vol. 43, No. 4, pp. 189-191. April 1951.

The requirements of a portable wind tunnel for the study of soil erosion by wind are outlined. The tunnel constructed to meet these needs is described. A differential-type dust collector developed for obtaining quantitative estimates of materials eroded from test surfaces with the tunnel is also described.

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CALIBRATION OF A PORTABLE WIND TUNNEL FOR THE SIMPLE DETERMINATION OF ROUGHNESS AND DRAG ON FIELD SURFACES.

By A. W. Zingg and N. P. Woodruff; Agron. Jour. Vol. 43, No. 4, pp. 191-193. April 1951.

A simple method of operating a portable wind tunnel to obtain known levels of drag on varying field surfaces is presented. Given also is a simple method of evaluating the roughness of a field test surface in terms of a standard surface of known characteristics.

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THE ROLE OF AQUIFERS IN WATER SUPPLY.

By Raphael G. Kazmann; Trans. Amer. Geo. Union, Vol. 32, No. 2, pp. 227-230. April 1951.

The concept of "safe yield" is analyzed, and it

is shown that, instead of having a single value in any given hydrogeologic situation as has been assumed, it has many possible values; hence, it is not a useful concept. As an alternate approach to the problem of perennial ground-water supply, the functions of aquifers are stated, the tasks of the science of hydrogeology are outlined, and it is shown that by means of hydrologic engineering based on permissive legislation, legislation which is compatible with the doctrine of appropriation, withdrawals of ground-water can be increased to almost any desired extent without danger of aquifer depletion.

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A GENERAL FORMULA FOR HYDROLOGIC FREQUENCY ANALYSIS.

By Ven Te Chow; Trans. Amer. Geo. Union, Vol. 32, No. 2, pp. 231-237. April 1951.

A general formula is presented to simplify many existing methods of hydrologic frequency analysis. It is shown that the methods differ only in the definition of the frequency factor contained in the formula. The derivation of the formula is simple, and does not require familiarity with advanced mathematics and statistics. The application of the formula is practical so that it provides a valuable tool for the hydrologic design of hydraulic structures.

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PROGRESSIVE WAVES IN NON-ARTESIAN AQUIFERS.

By P. Wilh. Werner and Daniel Noren; Trans. Amer. Geo. Union, Vol. 32, No. 2, pp. 238-244. April 1951.

The present study deals with progressive waves in ground-water aquifers under water-table conditions. The theory developed aims at clarifying the characteristics of the non-steady flow in question. Moreover, it gives the clue to the determination of certain basic factors in the natural ground-water control, and to the explanation of some phenomena concerning the relation between subsurface runoff and replenishment or rainfall.

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VARIATIONS IN STORM RAINFALL OVER SMALL AREAS.

By Ray K. Linsley and Max A. Kohler; Trans. Amer. Geo. Union, Vol. 32, No. 2, pp. 245-250. April 1951.

Variation in rainfall over small areas has been a subject of considerable interest to hydrologists and meteorologists, but, because of inadequate data, little analytical work has been possible. The precipitation-gage network established for the Army-Navy-NACA-Weather Bureau

Thunderstorm and the Weather Bureau Cloud Physics Projects near Wilmington, Ohio, included 55 rain gages at approximately two-mile intervals. Utilizing data from this network the authors have analyzed the variations in average precipitation for storms computed from networks of differing densities and the relation between point and areal-average values of rainfall in storms.

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STUDIES ON THE NUTRITION OF PASTURE PLANTS IN THE SOUTH-WEST OF WESTERN AUSTRALIA. I. THE EFFECT OF COPPER, ZINC, AND POTASSIUM ON THE GROWTH OF THE DWALGANUP STRAIN OF TRIFOLIUM SUBTERRANEUM L. ON SANDY SOILS.

By R. C. Rossiter; Australian Jour. of Agr. Res., Vol. 2, No. 1, pp. 1-13. January 1951.

The results of pot-culture experiments and field trials designed to examine the effects of copper, zinc, and potassium on the growth of Dwalganup subterranean clover on a number of Western Australian soils are presented and discussed.

Highly significant yield increases from application of one or more nutrients were observed on all soils examined. The effects of applied copper were greater in the second year than in the succeeding year under deficiency conditions in the field. Significant interaction effects were observed only with copper and potassium.

Maximum yields in two of the field trials were low even with application in all three nutrients. Reasons for this are suggested.

Data on leaf area changes indicated that, in contrast to the increasing severity of potassium deficiency with age of the plant, both copper and zinc deficiency tended to diminish after the commencement of the flowering stage. The importance of such time trends in the interpretation of interaction effects is emphasized.

The economic significance of the potassium problem is stressed and a number of aspects requiring investigation are outlined.

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STUDIES ON THE NUTRITION OF PASTURE PLANTS IN THE SOUTH-WEST OF WESTERN AUSTRALIA. II. VISUAL SYMPTOMS OF MINERAL DEFICIENCIES ON THE DWALGANUP STRAIN OF TRIFOLIUM SUBTERRANEUM L.

By R. C. Rossiter; Australian Jour. of Agr. Res., Vol. 2, No. 1, pp. 14-23. January 1951.

The visual symptoms of several mineral deficiencies on the Dwalganup strain of subterranean clover are outlined.

Phosphorus, nitrogen, and molybdenum deficiencies particularly reduce the rate of leaf production

and leaf size. They may be distinguished by leaf color - dark green in phosphorus deficiency and greenish yellow to pale yellow in nitrogen and molybdenum deficiency.

Sulphur deficiency reduces the rate of leaf production after the onset of symptoms. Leaf size was not greatly affected by the degree of sulphur deficiency studied. The older leaves were uniformly lemon yellow in color.

Both potassium and zinc deficiency result in very pronounced reduction in leaf size. Potassium deficiency, in addition, shows marginal necrosis of older leaves, while with zinc deficiency leaf shape is profoundly affected.

Copper deficiency particularly reduces seed production. The leaves are lighter green in color than normal.

With calcium (and manganese) deficiency, no prominent symptoms were recorded on the soils used.

The advantages and limitations of diagnosis by visual symptoms are discussed.

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STUDIES IN THE VARIATION OF SOIL REACTION. I. FIELD VARIATIONS AT BAROOGA, N.S.W.

By R. G. Downes and R. S. Beckwith; Australian Jour. of Agr. Res., Vol. 2, No. 1, pp. 60-72. January 1951.

A study was made of the variability of soil reaction, in the field, on Barooga Field Station, N.S.W., and on portion of a nearby property. Soil samples were taken at two depths, 0-4 in. and 4-8 in., at 4-chain intervals according to a rectangular grid. Other samples were taken at 1/2-chain intervals on restricted areas, and at 1-foot intervals on grids 4 feet by 3 feet. Differences of more than 3 pH units have been found for samples taken in one continuous area of a single soil type, and differences in excess of 2.5 pH units for individual samples taken 4 chains apart. The differences between individual samples at distances of 1/2 chain and 1 foot were found to be as large as 1.2-2.0 pH units and 0.6-1.1 pH units respectively. The standard deviation of the differences between adjacent points were considerably smaller in the samples spaced at 1-foot intervals.

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STUDIES IN THE VARIATION OF SOIL REACTION. II. SEASONAL VARIATIONS AT BAROOGA, N.S.W.

By M. Raupach; Australian Jour. of Agr. Res., Vol. 2, No. 1, pp. 73-82. January 1951.

The seasonal and spatial contributions to the variation in reaction of two Australian soils were examined. Experiments described show

seasonal effects to be slight and spatial variation contributions large. Exchangeable sodium from soluble salt variations is shown to give rise to the differences in reaction upon one soil while calcium and magnesium relationships may, among other factors, be responsible for those on the other.

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STUDIES IN THE VARIATION OF SOIL REACTION. III. VARIATIONS AT THE WAITE AGRICULTURAL RESEARCH INSTITUTE.

By M. Raupach; Australian Jour. of Agr. Res., Vol. 2, No. 1, pp. 83-91. January 1951.

Variations in reaction and total soluble salts of a red-brown earth from South Australia were assessed. Seasonal changes are discernible for reaction but are largely masked by spatial variations even over small areas. The amplitude of the seasonal changes is of the order of 0.15 of a pH unit, the soil returning to the same pH value during the succeeding season. Spatial variations have been found for organic carbon, nitrogen, clay, and exchangeable cations over small areas. Data are presented to show that while the mean soil reaction does not vary widely, there is a variation in the variance of the reaction values about the mean with season.

The change of the reaction status of the soil with time over a small area does not consist of a uniform increase and decrease of all the reaction values in the area but rather of a reorganization of all hydrogen ion contributing factors to give difference in dispersion about the mean value.

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A PRELIMINARY STUDY OF THE APPLICATION OF THE PERCENTAGE YIELD CONCEPT TO THE RESPONSE OF FORAGE CROPS TO IRRIGATION WATER.

By J. M. Appleton and F. L. Wynd; Scientific Agr., Vol. 31, No. 4, pp. 139-147. April 1951.

The historical background and the application of the percentage yield concept of crop response to soil nutrients are discussed. Field experiments were carried out to determine to what extent the percentage yield concept could be applied to the effect of irrigation water on the yield of dry matter of a grass-clover mixture and of immature oats.

Experiments in 1948 failed to indicate the validity of the percentage yield concept as applied to the effect of irrigation water on the growth of grass-clover mixture. However, a close agreement was obtained in the experiment of 1949 between the magnitude of the response of oats due to irrigation water and that predictable by the percentage yield concept.

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WATER EROSION OF SOIL.

By R. E. Cordukes, R. C. Turner, P. O. Ripley and H. J. Atkinson; Scientific Agr., Vol. 31, No. 4, pp. 152-161. April 1951.

The results of erosion experiments on a Rideau clay soil near Ottawa, Canada, for the years 1945 to 1949, inclusive, are presented. The runoff losses and the physical and chemical properties of the soil and the eroded material are discussed. Rainfall intensity rather than the total precipitation was the major factor in affecting soil erosion. Maintenance of a good vegetative cover and the use of farm manure reduces soil and water losses materially.

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STUDIES ON SOIL PHOSPHORUS: I. A METHOD FOR THE PARTIAL FRACTIONATION OF SOIL PHOSPHORUS.

By Colin H. Williams; The Jour. of Agr. Sci., Vol. 40, No. 3, pp. 233-242. July 1950.

Chani's method for the partial fractionation of soil phosphorus was simplified. It was shown that successive single extractions with 2.5 percent acetic acid-1 percent 8-hydroxyquinolin and 0.1 N-sodium hydroxide gives a good fractionation of the phosphate compounds present.

The relative effects of cupferron and 8-hydroxyquinoline as reagents for blocking the absorption of phosphate were also investigated. Cupferron precipitated aluminum more completely than did 8-hydroxyquinoline at the pH used for the extraction. However, because of its instability and also because of indication that it may attack organic forms of phosphorus cupferron was considered to be of less value than 8-hydroxyquinoline in the fractionation of soil phosphorus.

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STUDIES OF SOIL PHOSPHORUS: II. THE NATURE OF NATIVE AND RESIDUAL PHOSPHORUS IN SOME SOUTH AUSTRALIAN SOILS.

By Colin H. Williams; The Jour. of Agr. Sci., Vol. 40, No. 3, pp. 243-256. July 1950.

A study of residual phosphorus in soils resulting from the use of phosphate fertilizers was made, using a simplification of Chani's method for the fractionation of soil phosphorus. In cultivated soils all the residual phosphorus was extractable by successive extractions with 2.5 percent acetic acid - 1 percent 8-hydroxyquinoline and 0.1 N-sodium hydroxide and practically all had remained in the inorganic form; very little, if any, change in organic phosphorus was recorded as a result of the application of superphosphate.

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STUDIES ON SOIL PHOSPHORUS: III. PHOSPHORUS FRACTIONATION AS A FERTILITY INDEX IN SOUTH AUSTRALIAN SOILS.

By Colin H. Williams; The Jour. of Agr. Sci., Vol. 40, No. 3, pp. 257-262. July 1950.

A simplification of Chani's method for the fractionation of soil phosphorus was used to study relationships between soil and plant phosphorus in field and pot-culture experiments. In pot-culture experiments with red-brown earth soils (pH 5.6-6.1) wheat derived approximately 60 percent of its phosphorus from the fraction of soil phosphorus soluble in 2.5 percent acetic -1 percent 8-hydroxyquinoline and 30 percent from the organic fraction soluble in 0.1 N-sodium hydroxide, even although the amount of acetic acid soluble phosphorus present in these soils was only about half that present as inorganic alkali soluble. Very little use was made of organic phosphorus.

In field experiments with similar soils there was a correlation between the percentage phosphorus in the plant material and the acetic acid soluble, the inorganic alkali soluble, and the sum of these two fractions of soil phosphorus. The sum of these two fractions was also correlated with the amount of phosphorus taken up by the crop.

The value of this method of fractionation of soil phosphorus as a fertility index was indicated. For neutral to slightly acid red-brown earth soils either the acetic acid or inorganic alkali soluble fraction or their sum may be used as an index of phosphate fertility. For alkaline soils of the type examined the inorganic alkali soluble fraction appears to be the most suitable index.

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STUDIES IN SELECTIVE WEED CONTROL: III. THE CONTROL OF ANNUAL WEEDS IN LEGUMINOUS CROPS WITH 2,4-DINITRO-6-SECONDARY-BUTYL-PHENAL.

By H. A. Roberts and G. E. Blackman; The Jour. of Agr. Sci., Vol. 40, No. 3, pp. 263-274. July 1950.

Field and pot studies were carried during 1947-1949 first to assess the herbicidal properties of 2,4-D, and secondly to determine its value for selective weed control in leguminous crops. It was found that wide variations in concentration were required to produce a standard kill with different species of weeds. It would appear that the use of dinitro-butyl-phenal or its ammonium salt could be extended to cover selective weed control in undersown cereal crops, cereal-legume mixtures and some of the more resistant legumes, such as autumn-sown field beans.

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SAVE THE SOIL AND SAVE TEXAS.

By Delbert Willis; Amer. Forester, Vol. 57, No. 5, pp. 6-9. May 1951.

A newspaper has rallied every corner of the State to the conservation crusade with a \$13,000 annual awards program supported by 24 business organizations. Competition for prizes is producing some outstanding projects.

KESWICK ERASES EROSION.

By William M. Carah; Amer. Forester, Vol. 57, No. 5, pp. 21-38. May 1951.

Using rock check dams and planting natural cover, crews are reducing ravages of nature on this California watershed.

BETTER HAY AND PASTURE WITH TRASH MULCH SEEDINGS.

By H. L. Borst; Ohio Agr. Exp. Sta. Farm and Home Res., Vol. 36, No. 269, pp. 19-21. March-April 1951.

Practical field trials conducted in 16 counties of eastern and southern Ohio from 1944 to 1948, inclusive show that the trash mulch method of reclaiming idle land with legumes and grasses fills a definite need in the hill sections of Ohio.

The trash mulch method of preparation means working up the seedbed with some implement that leaves the plant residues in and on the surface rather than burying them, as ordinary plowing does. The trials were located on private farms. In all there were 90 trials on nineteen soil types. Nearly one-half of the seedings were made on idle land. Some such areas had not been cropped for 20 years, others from 5 to 15 years. An equal number of trial seedings were located on what was called pasture land. In many cases it was equally as unproductive as the idle areas. Some trials were made on old meadows.

Of the 90 trials, 81 were classed as successful at the end of the first season and 3 or 4 of the remaining 9 were declared successful at the end of the second season. Yields of 2 to 3 tons per acre of high quality legume-grass hay were reported from the trial areas used for hay and many days of summer pasture from others.

The results indicate that (1) the trash mulch method is a good erosion control practice. (2) That with proper liming and fertilizing, eroded and unproductive hill lands will produce profitable crops of grasses and legumes including alfalfa. (3) Sowing grasses and legumes, including alfalfa, is a logical first step in

restoring the productivity of eroded and unproductive hill land.

WATER EROSION CONTROL ON CULTIVATED LAND.

By J. H. Stallings; La Hacienda, Vol. 46, No. 6, pp. 38-40, 20 Vesey St., New York 7, N. Y. May 1951 and Better Farms, Vol. 11, No. 2, p. 6. July-August 1951.

This is a discussion of the major roles of the falling raindrop and surface flow in the soil erosion process. The primary role of the falling raindrop is the detachment of soil particles, whereas that of surface flow before concentrating into rills and gullies, is transportation of soil.

The falling raindrop applies its energy from above, and its chief role in the erosion process is detaching soil particles. It requires remedial measures entirely different from surface flow which applies its energy horizontally across the surface of the ground and whose chief role in the erosion process on cultivated land is transporting soil material. Measures aimed at controlling the effects of the falling raindrop, to be effective, must be designed to intercept and de-energize the raindrop before it strikes the ground. Those measures aimed at controlling surface flow must be designed to regulate concentration and to retard the movement of free water as it flows over the surface of the ground.

The secret of controlling erosion caused by the falling raindrop is the dissipation of the energy contained in it before it comes in direct contact with the ground surface. This can be accomplished by the proper use of vegetal covers, either living or dead. The secret of reducing the damage caused by surface flow is to control its concentration and to retard or regulate its velocity.

CONSERVATION OF MICHIGAN'S MUCK SOIL.

By Paul M. Harmer; Mich. Ext. Service, Ext. Bul. 307. 1951.

Conservation of Michigan's muck soil resources should embrace a development program for the large unreclaimed muck acreage of the state, a plan of conserving the mucks which have recently been brought under cultivation, and a procedure whereby any already badly depleted mucks may in some measure be restored to their original state of productivity.

For a muck area about to be reclaimed, a careful study should be made before the expense of reclamation is undertaken. This study should determine: First, whether there will be a demand

for the crops which might be produced on that area when reclaimed; Second, whether the type of muck is adapted for producing satisfactory yields of those crops; and Third, if drainage is undertaken, what depth of outlet ditch will give satisfactory but not excessive drainage for these crops.

Depletion of our older muck soils has been largely due to three agents of destruction: (a) excessive chemical decomposition: (b) fire; and (c) wind. A fourth, water erosion, sometimes has removed the surface material of our older well decomposed mucks.

AMMONIUM NITRATE AND POULTRY MANURE IN FERTILIZATION OF TOBACCO.

By T. R. Swanback; Conn. Agr. Exp. Sta. Bul. 546. March 1951.

This is a report of the results obtained from experiments with ammonium nitrate as a source of nitrogen for tobacco carried on for five years and with poultry manure for three years. Ammonium nitrate as the only source of nitrogen in tobacco fertilizer mixtures did not quite measure up to the results obtained with cottonseed meal. Most promising results were obtained with ammonium nitrate as a side dressing to supplement a 5-4-8 formula, thus furnishing sufficient plant food to equal an 8-4-8 grade. Both yield and grading were somewhat better than those obtained from the cottonseed meal, applied as the only source of nitrogen. Both dropping board and litter-mixed poultry manure were used as the only source of nitrogen as well as with mixed fertilizers as a partial source. Plowing under versus harrowing in the manure was also compared. Results indicated that litter-mixed material is about as valuable as that from dropping boards. There was little or no difference between plowing under and harrowing in the manure with respect to crop value received. However, plowing under resulted in somewhat better burn.

KIMBLE COUNTY RANCHMAN DOUBLES PRODUCTION ON SAME ACRES.

By H. L. Schofield; Sheep & Goat Raiser, Vol. 31, No. 8, pp. 24-25. May 1951.

Production was more than doubled on a 7,000-acre ranch in four years by the adoption of a conservation program. This increase in production was achieved by properly balancing numbers between the various classes of livestock and the kind of forage produced on the ranch, and by resting the grass in the fall and again in the early spring.

THE PROCEDURE OF ARTIFICIAL NUCLEATION FOR PURPOSE OF INCREASING RAINFALL.

By Dr. Irving P. Krick; Sheep & Goat Raiser, Vol. 31, No. 8, pp. 24-25. May 1951.

The volume of rain that will fall during a given storm may be increased in ratios ranging from 50 percent up to 500 percent. Every raindrop that falls from the clouds during a storm has been formed around a tiny particle of solid substance. This could be a tiny speck of dust, drawn from the earth's surface by gusts of wind. It could be a minuscule piece of loam or quartz or any one of hundreds of other minute particles invisible to the eye but constantly floating thru the atmosphere. Before any such particle can function to make rain it must encounter a super-cooled cloud whose temperatures are below freezing.

These various particles are able to cause the crystalization of moisture drawn to them at varying temperatures depending upon the character of the particle. As they float thru the sky and enter clouds of considerable moisture content, these tiny particles are ready to go to work provided the temperature of the cloud is adaptable to their particular nucleating needs. Minute, very cold water droplets that have been floating inside the cloud are drawn about the nuclei setting up a "chain reaction" which attracts additional moisture. When the particle has surrounded itself with sufficient moisture it becomes a small ice crystal or snowflake of sufficient weight to fall from the sky toward the ground. If the temperatures below the clouds are below freezing then it reaches the earth as a snowflake. If the temperatures are above freezing it melts and falls as a raindrop. In any rain or snow storm this process is repeated literally billions of times.

The work done by nature can be supplemented and aided by introducing silver iodide particles into the clouds to serve as tiny particles which will ultimately become, first ice crystals, then either snowflakes or raindrops. Small quarter inch particles of foundry coke are soaked in a liquid solution of silver iodide carefully prepared and weighed so that the volume of silver iodide in each pound of coke is definitely known. These small pieces of coke are then put into a fiery crucible equipped with a blower and heated to a temperature of between 2500 and 3000 degrees F. At that temperature silver iodide is expelled from the crucible as a gas. Immediately upon reaching the colder outside air this gas, which is invisible, is transformed into literally billions upon billions of tiny particles of solid silver iodide crystals. More than ten quadrillion tiny particles can be produced from each gram of silver iodide, each one of which will be a potential ice crystal when it reaches the supercooled cloud toward which it is projected. The great advantage of silver iodide is

that its particles begin to attract moisture at a temperature of approximately 25 degrees F. thereby nucleating at much higher temperatures than most of nature's particles. In nature, the lower temperatures adaptable for nucleation by natural particles exist normally at high atmospheric levels. Because silver iodide functions at higher temperatures it is thus able to wring more water out of clouds than would fall naturally by acting upon the moisture in lower portions of a cloud mass.

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GROWTH AND NUTRIENT UPTAKE OF LADINO CLOVER GROWN ON RED AND YELLOW AND GREY-BROWN PODZOLIC SOILS CONTAINING VARYING RATIOS OF CATIONS.

By Joel Giddens and Stephen J. Toth; Agronomy Jour., Vol. 43, No. 5, pp. 209-213. May 1951.

Two crops of Ladino clover were grown in the greenhouse on Annandale and Sassafras soils from New Jersey and on Cecil and Tifton soils from Georgia formed from analogous parent materials. The New Jersey soils contained predominantly illitic clay minerals, and the Georgia soils contained largely kaolinite clay minerals. Seven different soil treatments were used to give wide variations in exchangeable Ca, Mg, and K while other ions and the soil's cation exchange capacity were kept constant.

Annandale and Cecil soils gave the highest yields, both being about equal. Sassafras soil gave the lowest yield. Low yields were obtained on soils when either Mg or K was the dominant exchangeable cation, and no growth was obtained on the Tifton soil with the highest content of exchangeable K. With Ca as the dominant cation, no specific cation ratio gave the best yield of Ladino clover.

There was no consistent difference in the absorption of plant nutrient elements, except total N, from any of the soils. The N content of the clover was higher on the illitic soils (Annandale and Sassafras) than on the kaolinitic soils (Cecil and Tifton). An increase in the soil of Ca, Mg, or K resulted in increased uptake of these cations by clover. Potassium exerted the greatest effect upon the uptake of the other cations. Low P content of plants occurred with low Mg in the second cutting. Total N and S were higher for most high K plants. Cation summation values for the clover were fairly constant for the first cutting, but some extreme variations occurred in the second cutting. Wider ratios of cations existed in the soils than in the plants. It was not possible to use Mehlich's equation to predict cation content of plants from data based on cation release from the soils with dilute acid.

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COMPARISONS OF CLONAL ISOLATIONS OF POA PRATENSIS L. FROM GOOD AND POOR PASTURES FOR VIGOR, VARIABILITY, AND DISEASE REACTIONS.

By D. C. Smith and E. L. Nielsen; Agron. Jour., Vol. 43, No. 5, pp. 214-218. May 1951.

Clonal isolations from approximately 50 sod samples from each of 10 pastures located under various conditions in southern Wisconsin were observed for uniformity of type, relative vigor, and powdery mildew and leaf rust reactions.

Vigorous types occurred in clonal progenies from poor pastures. These were somewhat less frequent than among progenies derived from good pastures. Intensity of grazing appeared to exert little influence on the relative proportions of the biotypes for vigor.

Significant differences occurred among pastures for proportions of plants resistant and susceptible to powdery mildew and leaf rust. These did not appear to be closely associated with soil type, available moisture, or management.

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POLLINATION CYCLES OF SOME GRASSES IN OKLAHOMA.

By Melvin D. Jones and John G. Brown; Agron. Jour., Vol. 43, No. 5, pp. 218-222. May 1951.

The purpose of these investigations was to obtain information on the time of day and number of days that certain grasses shed pollen at Stillwater, Okla. Some attention was given to variations in meteorological conditions which appeared to affect the periodicity of pollen shedding.

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CHEMICAL CONTROL OF JOHNSON GRASS ON A HEAVY SOIL IN NORTHWEST TEXAS.

By R. D. Hamilton, C. J. Whitfield and H. E. Rea; Tex. Agr. Exp. Sta. Prog. Rpt. 1345. March 27, 1951.

Sodium chlorate, Atlacide, sodium trichloroacetate, Polybor-Chlorate and other chemicals have been used successfully to kill small patches of Johnson grass. They are expensive, but their use is usually more efficient and cheaper in the long run than attempting to eradicate small patches of this grass with the use of hand implements.

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EFFECTS OF FERTILIZERS ON THE SHIPPING QUALITY AND YIELD OF TOMATOES IN EAST TEXAS.

By P. A. Young; Tex. Agr. Exp. Sta. Prog. Rpt. 1353. April 5, 1951.

Increasing nitrogen from 20 to 80 pounds per acre significantly increased yields of marketable tomatoes. However, increasing the nitrogen beyond 80 pounds per acre did not further increase the yields. Eighty pounds of nitrogen per acre appears to be the largest practical amount for satisfactory yields.

Phosphoric acid at the rate of 40 pounds per acre and potash at the rate of 20 pounds per acre appeared to be adequate for maximum yields under the conditions of these experiments.

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EFFECT OF SUMMER FALLOW ON YIELDS OF COTTON AND SORGHUM IN THE HIGH PLAINS OF TEXAS.

By E. B. Reynolds and D. L. Jones; Tex. Agr. Exp. Sta. Prog. Rpt. 1357. April 9, 1951.

Summer-fallowed land produced slightly larger yields of cotton and sorghum than non-fallowed land over a period of 26 years, 1915-40, at the Lubbock station. The increases in yield, however, were not great enough to justify the non-use of land in summer fallow with cotton and sorghum in the region.

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CORN FERTILIZER TESTS IN NORTH-CENTRAL TEXAS, 1949-50.

By J. H. Gardenhire, J. C. Smith and D. I. Dudley; Tex. Agr. Exp. Sta. Prog. Rpt. 1360. April 10, 1951.

No significant increases in yield were obtained in 1950 from the use of nitrogen. An application of 60 pounds of phosphoric acid per acre increased the yield of corn 12.5 bushels per acre. Nitrogen and phosphoric acid applied together did not significantly increase the yield of corn above that obtained with phosphoric acid alone.

The results of the 1949 test indicate that nitrogen and phosphoric acid should be applied together on San Saba clay soil to obtain the maximum yields of corn from commercial fertilizers. The 1950 results indicate that phosphorus was the limiting factor in obtaining increased yields on Denton stoney clay soil.

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NUTRITIONAL PROBLEMS OF PEANUTS IN SOUTHEASTERN ALABAMA.

By Franklin L. Davis; Better Crops with Plant Food, Vol. 35, No. 4, pp. 6-10 and 45-48. April 1951.

The results of cooperative field tests conducted during the last two years in southeastern

Alabama on the effects of lime and gypsum on runner peanuts have disclosed some interesting facts concerning the nutritional needs of peanuts on the soils of that area. Chief among these are:

Both the exchangeable calcium content of the soil and the shelling percentage are good indications of the need of calcium as lime or gypsum.

Lime and gypsum treatments gave increases in the shelling percentage of peanuts on all soils on which they produced significant increases in yields.

Responses in yield from lime and gypsum have been limited and sometimes prevented by insufficient potash supplied by the soil and fertilizer.

The use of large amounts of potash in the fertilizer or sidedressings of additional potash resulted in decreased quality and yield of peanuts on the plots receiving no calcium.

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MORE CORN AT NO EXTRA COST.

By A. C. Caldwell; Better Crops with Plant Food, Vol. 35, No. 4, pp. 11-16. April 1951.

On the Richard Clayton farm in Mower County, Minnesota, more than 15 bushels more corn per acre were obtained from the same amount of fertilizer simply by increasing the stand of corn. Doubling the plant population from two stalks per hill (7,840 plants per acre) to four stalks per hill (15,680 plants per acre) increased the yield from 100 pounds of fertilizer by 15.2 bushels. These are findings which, to a greater or less extent, would be true probably on many farms growing corn.

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LIME REMOVALS BY - EROSION, LEACHING, CROPS, FERTILIZERS, SPRAYS, AND DUST.

By C. L. W. Swanson; Better Crops with Plant Food, Vol. 35, No. 4, pp. 18-20 and 44-45. April 1951.

This article discusses the removal of lime from the soil in a number of ways.

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FIELD OBSERVATIONS ON TALL FESCUE.

By Edgar A. Hodson; Better Crops with Plant Food, Vol. 35, No. 4, pp. 21-24 and 39-40. April 1951.

Seloom has a new crop had the attention that has been given to tall fescue the past few years. Farmers are making extensive plantings of this grass and are asking numerous questions about

establishing and managing it.

Field observations give convincing proof that fescue has a very definite place in the permanent pasture phase of the soil conservation work in Arkansas. But because of the claims that have been made for it, some growers have expected too much. It is, however, better than any other perennial cool season grass that has been widely grown here.

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CAN SOIL ORGANIC MATTER BE ACCUMULATED?

By Joel Giddens, F. H. Perkins, and W. A. Collins; Better Crops with Plant Food, Vol. 35, No. 4, pp. 25-26 and 42-43. April 1951.

This paper relates certain physical factors of some of the leading soil series to organic matter content and examines the effect of several so-called "land-building" practices on soil organic matter.

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THE INFLUENCE OF SEEDBED CONDITIONS ON THE REGENERATION OF EASTERN WHITE PINE.

By David M. Smith; Conn. Agr. Exp. Sta. Bul. 545. February 1951.

One of the most critical stages in the life-cycle of eastern white pine comes between the time of seed dispersal and the middle of the first growing season. The quality and composition of the future stand are largely determined by the factors which control the number of seedlings present at the end of this period. The main objective of this investigation was to ascertain the nature and extent of the influence of seedbed characteristics during this stage of the process of regenerating white pine.

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COTTON ROOT ROT AND LAND USE STUDIES AT THE BLACKLAND EXPERIMENT STATION.

By R. J. Hervey, F. L. Fisher and J. R. Johnston; Tex. Agr. Exp. Sta. Prog. Rpt. 1364. April 21, 1951.

This report gives the effect of land classes and cropping systems on cotton root-rot incidence and yield at the Blackland Experiment Station for 1948-50. Cropping systems with cotton following legumes, grasses and grass-legume mixtures have been used in some experiments for 3 years.

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CORRELATION OF FORAGE YIELDS AND SOLUBLE SOIL PHOSPHORUS ON LAKE CHARLES CLAY LOAM.

By L. C. Kapp and Robert L. Cheaney; Tex. Agr. Exp. Sta. Prog. Rpt. 1369. May 14, 1951.

Easily-soluble phosphorus (P) was determined in samples of soil from plots of a pasture experiment near Beaumont to which different amounts of rock phosphate and superphosphate had been applied.

The results showed a significant correlation between total forage yields and the quantities of P soluble in extraction solutions which were 1.0 normal with respect to sodium acetate, and 1.0 normal, 1.5 normal or 2.0 normal with respect to hydrochloric acid. When yield data for individual dates of harvest were used, significant correlation values were found with the 2.0 normal extracting solution.

One unit of P extracted by the 1.0 normal hydrochloric acid solution was found to be equivalent to 4.1 units extracted by the 1.5 normal solution and to 7.3 units extracted by the 2.0 normal solution. The greater spread in P extracted by the more acid solutions would be valuable in making fertilizer recommendations based on results of tests of soils which are low in P.

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RENOVATION AND FERTILIZATION OF ESTABLISHED STANDS OF KING RANCH BLUESTEM.

By R. C. Potts, Lucas Reyes, E. M. Neal, L. C. Kapp and R. A. Hall; Tex. Agr. Exp. Sta. Prog. Rpt. 1371. May 18, 1951.

The results from this test indicate that nitrogen and phosphate in combination are needed to stimulate the growth of King Ranch bluestem. Nitrogen was effective in increasing the protein and potash contents of the forage. The addition of phosphate in combination with nitrogen almost doubled the phosphoric acid content of the plant. Renovation improved forage quality, but did not influence immediate forage yields in this dry year. It is evident that on soils low in fertility, King Ranch bluestem cannot be expected to produce forage with sufficient minerals for good livestock production.

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PROGRESS REPORT, 1945-1951 SOUTHEAST OKLAHOMA PASTURE-FERTILITY RESEARCH STATION.

By Horace J. Harper and W. C. Elder; Okla. Agr. Exp. Sta. Mimeo. Cir. M-221. May 1951.

This is a summary of the accomplishments of the studies conducted with pasture near Coalgate, Okla.

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THE SOIL UNDER NATURAL AND CULTURAL ENVIRONMENTS.

By Roy W. Simonson; Jour. Soil and Water Con., Vol. 6, No. 2, pp. 63-69. April 1951.

This article describes a few of the great soil groups with comments on the shifts that follow their use. Soils tend to become different in their natural environment. Under the cultural environment imposed by man, the differences among the soils and soil groups are reduced. We tend to lower the fertility levels in the richest soils and raise them in others. On the whole, more changes are made in the chemical than the physical properties.

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TERRACE DRAINAGE OF ALMENA SOILS IN CENTRAL WISCONSIN.

By A. J. Wojta, C. B. Lanner, and R. J. Mackenhion; Jour. Soil and Water Con., Vol. 6, No. 2, pp. 70-74 and 98. April 1951.

This paper points out how a drainage system including channel type terracing and land leveling program was established on very poorly drained to moderately well drained land in central Wisconsin. The system, costing approximately \$7.00 to \$17.00 per acre, proved beneficial to corn, small grain and forage. Previous attempts to drain such soils included tile, bedding, large interceptor ditches, and ridge type terraces; all of which failed to provide adequate drainage.

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THE WATER SITUATION IN THE UNITED STATES.

By Joseph V. B. Wells and Adrian H. Williams; Jour. Soil and Water Con., Vol. 6, No. 2, pp. 78-82 and 100. April 1951.

During the past half century the use of water has increased more rapidly than our population. Although complete figures on the use of water are not available it has been estimated on the basis of fragmentary data that municipal water use in the United States has increased six-fold during the period 1890 to 1945, while the population increased two-fold.

According to studies an average of 30 inches of water falls as rain, hail or snow each year, and that about 22 inches is evaporated or used by vegetation, and eight inches runs off into the ocean after traveling through the ground. This eight inches represents the bulk of the water available for use by man, and it is several times greater than the present use.

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WHAT DETERMINES THE VALUE OF WATER?

By George D. Clyde; Jour. Soil and Water Con.,

Vol. 6, No. 2, pp. 87-91 and 106. April 1951.

People throughout the land are becoming water conscious. They recognize the limit of the growth of this nation will be its water supply - already new sources of supply are being considered. Research is being directed towards cloud seeding, making water potable, salvaging sewage and industrial wastes, recharging underground aquifers, and other methods. All of these methods of increasing water supplies will be extremely costly. In the end such costs may fix the market value of water but not the real value. This depends upon its use and conservation.

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SEDIMENT STEALS WATER STORAGE.

By Carl B. Brown; Jour. Soil and Water Con., Vol. 6, No. 2, pp. 92-98. April 1951.

The early ruin of costly multiple-purpose reservoirs has been predicted because of sedimentation, unless action is taken at once to control watershed erosion. Watershed planning is the key to translating this concept of sediment control into reality with the greatest effectiveness in the shortest time at the least cost. To accomplish this, four factors must be recognized. They are; hydrologic controls of the drainage basin, hydrologic control units should be divided into sub-watershed planning units, a plan of treatment should be prepared, and all farm and ranch land should be used according to its capability and treated according to its need.

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FUTURE WOOD MARKETS AND FOREST MANAGEMENT.

By John A. Zirnuska; Jour. of Forestry, Vol. 49, No. 5, pp. 326-330. May 1951.

This paper analyzes the problem of wood markets, develops long-term speculations, and illustrates the relationship to the objective of forest management.

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THE EFFECT OF CIRCULAR PERFORATIONS ON FLOW INTO SUBSURFACE DRAIN TUBES: III. EXPERIMENTS AND RESULTS.

By G. O. Schwab and Don Kirkham; Agr. Eng., Vol. 32, No. 5, pp. 270-274. May 1951.

Theoretical equations which give the effect of drain-tube perforations on drain-tube performance in water-saturated soil under a horizontal water table were verified experimentally using electric models to simulate the seepage flow condition. The experimental results confirmed the theory.

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NEW TWIST ON SEDIMENT.

By E. J. Carlson; Bu. Reclamation, The Reclamation Era, Vol. 37, No. 6, pp. 109-111. June 1951.

This article describes a type of curve divided wall employing the curve principle of diversion for diverting sediment from canals.

SHORT CUT TO WEED KILLING CALCULATIONS: III. RAISING THE BOOM.

By John T. Maletic; Bu. of Reclamation, The Reclamation Era, Vol. 37, No. 6, pp. 126-127. June 1951.

This article presents a monogram which may be used in determining how high the boom of the spray rig should be raised for most effective results.

THE SOIL GETS WEIGHED AND MEASURED.

By C. L. W. Swanson; Con. Agr. Exp. Sta., Frontiers of Plant Science, Vol. 3, No. 2, p. 6. May 1951.

A sampling apparatus which cuts out cores of soil quickly and easily and permitting them to retain their original shape is described. The main part of the sampler is a hollow core with a hard steel cutting head for penetration into the soil. A brass cylinder fits snugly inside of the casing and holds the soil core as it is cut. After cutting, the casing is taken apart and the core of soil pushed out. The sampler operates vertically, with no sideways or rotary motion, thus incurring that samples are obtained in their natural condition. The apparatus is mounted on a rigid frame which keeps the core sampler in one position and permitting the attachment of a hammer for driving the core cutter into the soil. It is mounted on wheels and can be quickly moved from place to place.

LIST OF REFERENCES TO BORON LITERATURE REVIEWED JULY-SEPTEMBER 1949.

By Library; Amer. Potash Institute, 1102 16th St., N. W., Washington 6, D. C. April 1951.

This is a list of articles dealing with boron arranged by States. Most of them were published in 1948 and 1949.

LIME, PHOSPHATE AND POTASH FOR ALFALFA IN THE UPPER PENINSULA OF MICHIGAN.

By A. R. Wolcott and Wm. Cargo; Mich. Agr. Exp. Sta. Quarterly Bul., Vol. 33, No. 4, pp. 337-342. May 1951.

A series of experiments was started in the upper peninsula of Michigan in 1947 to investigate the possibility of minor element deficiencies on alfalfa. Lime, phosphate, and potash applications were included in these experiments. Results to date indicate: (1) potash is the first limiting factor on alfalfa yields and in the maintenance of alfalfa stands on the high-lime soils; (2) alfalfa yields can be profitably increased by topdressings of fertilizers containing both phosphate and potash on established stands; (3) no general deficiency of boron or other minor elements is indicated; and (4) lime is deficient for alfalfa on individual soils.

BROMEGRASS AS AN EFFECTIVE AGENT IN QUACKGRASS CONTROL.

By A. R. Wolcott; Mich. Agr. Exp. Sta. Quarterly Bul., Vol. 33, No. 4, pp. 343-350. May 1951.

An experiment including seven forage crops and mixtures and dates of planting was established on Trenary loam at Chatham in 1948. Results to date indicate: (1) quackgrass spreads very rapidly in stands of short-lived legumes and grasses and (2) bromegrass is a very effective competitor with quackgrass for space in a thinning legume stand.

GROWTH AND YIELDS FROM A FIFTY-YEAR-OLD WHITE PINE PLANTATION.

By Henry A. Stoehr; Mich. Agr. Exp. Sta. Quarterly Bul., Vol. 33, No. 4, pp. 426-436. May 1951.

In 1950, the stand averaged 13.2 inches in diameter, 78 feet in height and contained 16,500 board feet per acre. This amounts to a growth of 50 board feet per acre per year for the past 4 years, and a diameter growth of 0.2 inch per year. If mortality continues at the same rate as from 1932 to 1950 - about five trees per acre per year for the next 15 years - there will be 100 trees per acre in 1961. They will average 15.4 inches in diameter, and will be spaced an average of 21 feet apart. The stand will then be considerably more park-like, and mortality is expected to drop to an average of two trees per acre per year. Thus by the time the stand is 100 years old, in 1996, there will still be 30 trees per acre. If the rate of diameter growth of 0.2 inch per year continues, the stand will average 22 inches in diameter, and the trees will be spaced on an average of 35 feet apart.

MANAGING NORTHERN GREAT PLAINS CATTLE RANGES TO MINIMIZE EFFECTS OF DROUGHT.

By Leon C. Hurtt; USDA, Cir. No. 865. March 1951.

This is a report of a cattle grazing study conducted from 1932 to 1936, inclusive, to determine the rate of range stocking that would sustain high forage and livestock production, and stabilize range operations. Two sets of six pastures were established for summer and winter grazing. Two pastures in each set were stocked heavily, 2 moderately, and 2 lightly. The record shows an unmistakable advantage of moderate and light stocking for cattle production in drought years. It also makes clear fairly specific guides that can insure the producer smaller losses and survival when the next drought strikes.

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HYDROLOGY OF RATES AND AMOUNTS OF SURFACE RUN-OFF FROM SINGLE - AND MIXED - COVER WATERSHEDS.

By Leonard Schiff; USDA, SCS-TP-104. March 1951.

The purpose of this study was to develop methods of determining rates, the hydrograph, and amounts of surface runoff from a watershed using the major factors involved; namely, the precipitation pattern, infiltration rates, detention storage-rate of surface runoff relationships, and timing for that watershed. The method thus developed was to be such that the effect of changes in land use upon rates and amounts of surface runoff could be determined.

A comparison is made between computed and measured rates and amounts of surface runoff from single and mixed cover watersheds up to 75.6 acres. Computation of rates and amounts of surface runoff for a given precipitation pattern on a watershed with soil at different antecedent or initial soil-moisture contents and computation of rates and amounts of surface runoff for different precipitation patterns on a watershed with soil at the same initial soil-moisture content are made. The effect of changes in land use also is computed.

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CHEMICAL CONTROL OF BLUEWEED.

By R. D. Hamilton, C. J. Whitfield and H. E. Rea; Texas Agr. Exp. Sta. Prog. Rpt. 1375. May 29, 1951.

Two experiments to determine practical methods of controlling blueweed were started in 1950. Various combinations of cultivation, cropping and the use of 2,4-D are being tested in one experiment. In another, three rates each of the

three forms of 2,4-D, 2,4,5-T, a mixture of 2,4-D and 2,4,5-T, Ammate (ammonium sulfamate) and TCA (sodium trichloroacetate) were applied to infested square rod plots on June 6, 1950.

The chemicals were applied in water with a knapsack sprayer. One quart of solution was used per square rod, except on the Ammate and TCA treated plots where one gallon was used. In the 2,4-D amine emulsion, diesel fuel at the rate of one gallon per acre, and an emulsifier at the rate of one-fourth to one-half of 1 percent, were added.

Complete top kills were obtained on the plots treated with Ammate, TCA and the two pounds of 2,4-D amine emulsion. All other treatments gave only partial top kills. This was especially true on the plots treated with the one-half pound rates. Regrowth occurred on the Ammate and TCA treated plots in 4 to 6 weeks. Little or no regrowth occurred during 1950 on the plots treated with 2,4-D in the emulsion. The 2,4-D in this emulsion was translocated 12 to 18 inches into the blueweed roots.

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FRACTIONATION OF SOIL NITROGEN AND FACTORS AFFECTING DISTRIBUTION.

By V. V. Rendig; Soil Sci., Vol. 71, No. 4, pp. 253-267. April 1951.

Three mineral soils representing two common types found in the gray-brown soils area of southern Wisconsin were subjected to a fractionating procedure similar to that used to determine the distribution of nitrogen in proteins.

The proportions of the various forms of organic nitrogen in a virgin prairie soil and a virgin forest soil were remarkably similar. The largest difference was that the nonbasic amino nitrogen accounted for about 20 percent of the nitrogen in the former soil compared with about 23 percent in the latter. This fraction accounted for only about 15 percent of the total nitrogen in the soil of a cultivated area adjacent to the area from which the virgin forest soil was obtained. The cropped soil also contained a lower percentage of amide nitrogen and a higher percentage of nitrogen that was not extracted by the hydrolyzing treatment.

When these soils were stored under conditions favorable for nitrification, the greatest and most consistent decrease occurred in the nonbasic amino nitrogen fraction. In two of the three soils studied, the amide nitrogen also decreased but in the virgin Miami this form increased. The possibility is considered that under some conditions nitrogenous compounds containing relatively large amounts of the amide form may be synthesized. When the three soils were cropped with oats or were fallowed, the changes were

somewhat similar. An increase in humin nitrogen ("unhydrolyzed") similar to that found as a result of air-drying but of lesser magnitude also occurred, however, and might account for some of the changes found.

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SEPARATION OF MINERALS BY SUBDIVIDING SOLIDIFIED BROMOFORM AFTER CENTRIFUGATION.

By Roy P. Matelski; Soil Sci., Vol. 71, No. 4, pp. 269-272. April 1951.

A method for the separation of soil minerals by subdividing solidified bromoform after centrifugation is described. The method has the advantage of using the simple, inexpensive, durable, and common centrifuge tubes. These centrifuge tubes, unlike many of the special tubes, provide a larger surface on the heavy liquid for the minerals to begin settling. Since these tubes contain no valves, constrictions, or additional parts, they allow more rapid and efficient mineral separation.

Freezing the bromoform suspension of minerals after centrifugation allows complete and easy removal of the minerals from the centrifuge tube.

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A STATISTICAL STUDY OF THE RELATION BETWEEN pH AND THE EXCHANGEABLE-SODIUM-PERCENTAGE OF WESTERN SOILS.

By Milton Fireman and C. H. Wadleigh; Soil Sci., Vol. 71, No. 4, pp. 273-285. April 1951.

A study of the analytical records of a large number of soil samples was undertaken to clarify and evaluate the nature of the relation between exchangeable sodium and the pH of soils as revealed by correlation analysis. Consideration was also given to modifying factors that presumably could be taken into account by a skilled field worker; namely, lime, gypsum, soluble salt content, texture, soil:water ratio, and geographical location.

The generalized relation for 868 soils indicated that unit increase in pH_s (of the saturated soil) was associated with an increase of 20 units of exchangeable-sodium-percentage (ESP). The precision of the relation is such that if the field worker found the pH_s to be 8.5 he could validly predict that the chances are two out of three that the true value for the ESP lies somewhere between 17 and 50 percent. Less than half of the variance in ESP was found to be associated with concomitant variance in pH_s .

Exchangeable-sodium-percentage could be predicted from pH_s with greater precision than could exchangeable sodium content.

When the soil samples were segregated according to the content of lime or gypsum, or both, it was found that the slopes of the respective regression lines varied to a highly significant degree. This indicates the need to take into account the status of calcium compounds if ESP values are to be estimated from pH_s readings.

The presence of salts and texture of soil appeared to have a relatively minor effect on the generalized relation between pH_s and ESP.

The slope of the regression line between pH_s and ESP, the degree of concomitance (r^2), and the precision of prediction varied markedly, depending on the geographical location from which the samples were taken. Precision was no better in areas where samples were confined to one soil type than in those in which many soil types were involved.

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OCCURRENCE OF FLUORINE IN LIMESTONES AND DOLOMITES.

By C. D. Jeffries; Soil Sci., Vol. 71, No. 4, pp. 287-289. April 1951.

The fluorine contents of 32 limestones and dolomites from Pennsylvania, Ohio, New York, New Jersey, Maryland, Kentucky, and West Virginia were determined by a modified method of distillation as hydrofluosilicic acid. These samples are considered to be representative of limestones in general, particularly those produced commercially.

The study shows that fluorine may occur in average limestone or dolomite in amounts varying from a trace to 0.103 percent, with an average of about 0.035 percent. Two samples containing excessively high amounts, 0.61 and 2.11 percent, were found in the course of this work. These samples are of interest because they illustrate the possibility that limestones may contain extremely high amounts of fluorine under unusual conditions.

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LITHIUM TOXICITY IN CITRUS.

By D. G. Aldrich, A. P. Vanselow, and G. R. Bradford; Soil Sci., Vol. 71, No. 4, pp. 291-295. April 1951.

Lithium-toxicity symptoms have been artificially produced in citrus, and the presence of lithium in the affected plants has been confirmed by a recently developed spectrochemical method.

On the basis of the artificially produced symptoms, lithium toxicity in citrus in the field has been recognized and confirmed by analysis.

Concentrations of lithium in various parts of citrus plants showing toxicity symptoms are reported.

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FACTORS AFFECTING THE MOLYBDENUM CONTENT OF PASTURE PLANTS: I. NATURE OF SOIL MOLYBDENUM, GROWTH OF PLANTS, AND SOIL pH.

By Isaac Barshad; Soil Sci., Vol. 71, No. 4, pp. 297-313. April 1951.

Additional data on the variation of molybdenum content among different species of plants when grown on the same soil are presented. The effect of age on a few plants is also shown.

The excessive amount of molybdenum in certain California soils was found to be present mainly in three forms; namely, as a soluble molybdate salt, as a part of the soil organic matter, and possibly as an exchangeable molybdate anion. Growth and removal of high molybdenum plants was found to be the most effective means of reducing the water-soluble soil molybdenum. In consequence, successive crops contained less and less molybdenum.

The molybdenum content of a given plant was found to be inversely proportional to the rate of growth.

The molybdenum content tends to increase with age of plant, particularly during periods of slow growth.

The molybdenum content of two plant species studied was roughly proportional to the water-soluble molybdenum in a soil when the pH ranged between 4.7 to 7.5. The pH in this range apparently affected mainly the water-soluble molybdenum rather than, directly, the uptake of molybdenum. A suppression effect, however, on the uptake of molybdenum took place above pH 7.5.

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PHOSPHATES IN CALCAREOUS ARIZONA SOILS: III. DISTRIBUTION IN SOME REPRESENTATIVE PROFILES.

By W. H. Fuller and W. T. McGeorge; Soil Sci., Vol. 71, No. 4, pp. 315-323. April 1951.

The quantity and distribution of total, extractable, CO₂-soluble, and organic phosphorus as well as the organic carbon and "active" calcium were determined for nine calcareous Arizona soil profiles.

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MEASUREMENT OF SEDIMENTATION IN SMALL RESERVOIRS.

By L. C. Gottschalk; Proc. Amer. Soc. Civil Eng., Vol. 77, Separate No. 55, pp. 1-11. January 1951.

Measurements of the volume of sediment in reservoirs provide a basis for determining the extent of sedimentation damages, for periodically correcting the capacity curve to assure more efficient operation, for evaluating the effects of watershed and climatic factors on rates of sediment production from watersheds, and for developing sediment production indexes useful in the design of reservoirs. Sediment volumes may be determined by comparison of original contour maps with maps showing the present topography of the sediment surface or by direct measurement of sediment thicknesses. Two methods of survey are used - the contour method and the range method. Water depths are measured by use of a lead line, sounding pole, or echo sounder. Sediment thicknesses are determined by use of a spud, sounding pole, or soil auger. The specific weight of sediment is determined, and watershed studies are made in conjunction with reservoir sedimentation surveys. Water capacities and sediment volumes are computed for contour surveys by a modified prismoidal formula and for range surveys by the Dobson prismoidal formula.

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GRASSLAND FARMING IN ARKANSAS.

By Edgar A. Hodson; USDA Soil Conservation, Vol. 16, No. 12, pp. 267-269. July 1951.

Arkansas farmers have found that grass is the most efficient erosion-control and water-conserving tool they can use. They also have found that grass is a profitable cash crop when the grower has good livestock to harvest it. This article explains how a balanced pasture program with good livestock is paying good dividends.

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TRAILING RASPBERRY - ANOTHER OF THOSE VERSATILE PLANTS.

By Fred P. Eshbaugh; USDA Soil Conservation, Vol. 16, No. 12, pp. 269-272. July 1951.

The trailing raspberry shows promise for erosion control on tough sites in certain areas and has a number of other desirable features as well. This article describes these features briefly.

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WATER WEALTH LOST BY SILT POLLUTION.

By Curtis L. Newcombe; USDA, Soil Conservation, Vol. 16, No. 12, pp. 272-275. July 1951.

Water covers only about 2 percent of the land surface of the North American continent, but it exerts a tremendous influence for good or for bad on the land and on the future well-being of its people. Some impressions of its paradoxical, man-induced influence for bad are set forth in

this paper. They refer to the role of water in scouring misused lands, in transporting valuable loads of soil to the sea where recovery is minimal, and simultaneously decimating many valuable plant and animal communities which live in brooks, streams, creeks, rivers, harbors, bays, and coastal areas.

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KUDZU-23 - A NEW FINE-TEXTURED VARIETY.

By R. L. Davis and W. C. Young; USDA, Soil Conservation, Vol. 16, No. 12, pp. 279-280. July 1951.

Kudzu-23 has fine textured foliage with numerous small stems and small, almost-round leaflets. It represents an improvement in quality rather than forage yields. Kudzu-23 was developed by propagating from a single drought-resistant plant found on an eroded clay hillside near Watkinsville, Ga.

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PROGRESS REPORT, 1951 - SOIL AND WATER CONSERVATION RESEARCH AT THE RED PLAINS CONSERVATION EXPERIMENT STATION.

By Harley A. Daniel, Harry M. Elwell and Maurice B. Cox; Okla. Agr. Exp. Sta. Mimeo. Cir. M-219. April 1951.

Methods of controlling erosion, conserving moisture and bringing eroded and unused land into production in the Red Plains area have been studied since 1929 at the Red Plains Conservation Experiment Station, Guthrie, Okla. Research under way has as its objective discovering and devising means of controlling erosion and conserving moisture to reduce the possibilities of floods and to increase plant growth. The soils on this station are in general shallow, sloping, highly erodible, and low in organic matter and plant nutrients.

This report summarizes results of research on cropping systems on terraced and unterraced land, cover crops and fertilizers, methods of establishing and maintaining plant cover, gully control, and pasture and meadow development and management.

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PROGRESS REPORT, 1951: SOIL AND WATER CONSERVATION RESEARCH AT THE WHEATLAND CONSERVATION EXPERIMENT STATION.

By Harley A. Daniel, Harry M. Elwell and Maurice B. Cox; Okla. Agr. Exp. Sta. Mimeo. Cir. M-223. May 1951.

Methods of controlling erosion and conserving moisture for the north-western Oklahoma wheat

area have been studied since 1939 at the Wheatland Conservation Experiment Station near Cherokee, Okla. Research under way has as its objective discovering and designing means of conserving moisture to reduce the possibility of floods and to increase plant growth. Tillage practices and cropping systems are being studied as possible solutions. Tillage practices are tested on both terraced and unterraced land. This report, therefore, summarizes results of research on terraces and contour cultivation, tillage methods, fertilization, vegetated waterways, and water spreading.

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HOW TO CURB SOIL EROSION.

By Walter D. Ellison; U. S. Navy Budocks Tech. Digest, No. 17, NavDocks P- 23, pp. 27-28. May 1951.

This article pertains to controlling erosion with vegetal covers on cuts and fills, and on the smooth surface of open lands outside of waterways and channels. Work done by the energy of falling raindrops is at the root of both sheet and gully erosion. It puddles the soil and muddies the surface water until the ground pores become sealed against, the entry of water. When this occurs the soil laden water runs off and the gully carving processes may become active.

Vegetal covers, which protect soil against rain-drop impacts, will usually bring the erosion in check. Lands on which soil erosion is an important problem should be protected by a canopy of growing grasses, or by mulches spread on the ground.

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TRENDS AND VARIATIONS IN YIELDS FROM THE JORDAN FERTILITY PLOTS.

By Oivind Nissen, H. Arthur Meyer and A. Chester Richer; Pa. Agr. Exp. Sta. Bul. 533. October 1950.

Statistical analysis of yield data from the Jordan soil fertility plots gathered from 1882 to 1937 shows: That the fertility on the limed plots was maintained by manure and also by complete commercial fertilizer treatments, and that this level of fertility may be maintained indefinitely; That the annual variations in crop yields that were essentially due to the weather were generally 20 to 40 percent of average yields. Maximum annual deviations were 40 to 80 percent; That the large annual variations in crop yields not only were unpredictable but were difficult to explain on the basis of existing weather records; and That a good or poor harvest of one crop in the rotation meant nothing in regard to yields of other crops during the same

year.

WESTERN ALBERTA.

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REPLACING WYETHIA WITH DESIRABLE FORAGE SPECIES.

By Walter F. Mueggler and James P. Blaisdell; Jour. of Range Mgt., Vol. 4, No. 3, pp. 143-150. May 1951.

Studies were begun in 1947 to determine what methods might be successful in converting dense stands of wyethia to more desirable plants quickly. Applying 2,4-D ethyl ester at 2 pounds acid equivalent per acre between first and half bloom was comparatively economical and thorough means of eradicating wyethia. The 2,4-D does not greatly injure the native grasses; reduced competition from wyethia after treatment will allow a rapid increase in yield of other species. Reseeding, therefore, is necessary only on areas that lack a fairly abundant and well-distributed understory of other species.

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GRAZING HABITS OF CATTLE IN A MIXED-PRAIRIE PASTURE.

By Janes G. Morefield; Jour. of Range Mgt., Vol. 4, No. 3, pp. 151-157. May 1951.

The purpose of this study was to find when and how much time cattle spend at various activities in a mixed-prairie pasture. Cattle spent most of their time in April and May on the lowland areas. They shifted to the hillsides in June and July, and back to the lowland in August.

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CONTROLLING BIG SAGEBRUSH WITH 2,4-D AND OTHER CHEMICALS.

By A. C. Hull Jr., and W. T. Vaughn; Jour. of Range Mgt., Vol. 4, No. 3, pp. 158-164. May 1951.

Date of spraying or stage of plant development was important with best results when the twigs were about one-half inch long or half grown. Chemical treatments varied greatly but in general 2,4-D in the butyl form gave better results than did mixtures of 2,4-D and 2,4,5-T or contact sprays. The higher the rate of chemical, the better the kill, with as little as 1.5 pounds of acid per acre giving good results. Diesel oil was generally more effective than water as a carrier and appeared to be effective over a longer period than water. In most cases the higher the rate of oil, the better the results.

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CONDITION CLASSES ON MOUNTAIN RANGE IN SOUTH-

By W. R. Hanson; Jour. of Range Mgt., Vol. 4, No. 3, pp. 165-170. May 1951.

Four range-condition classes have been set up for the bunchgrass mountain range of the Rocky Mountain Forest Reserve in Alberta. The classes are based upon vegetative composition, soil condition, plant vigor and to a lesser degree upon plant density. The condition classes are used to measure attainment of the areas of the management plans and as a guide to further adjustment in stocking rates and practices.

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PAILLE FINE.

By Robert E. Williams; Jour. of Range Mgt., Vol. 4, No. 3, pp. 171-172. May 1951.

Paille fine or maiden cane, is an important forage plant on the lower wet prairies in the southern coastal plain.

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BLUESTEM RANGE IN THE PINEY WOODS OF LOUISIANA AND EAST TEXAS.

By John T. Cassady; Jour. of Range Mgt., Vol. 4, No. 3, pp. 173-177. May 1951.

This is a discussion of range conditions in the piney woods area of Louisiana and east Texas.

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KNOW YOUR SOIL: IX. THE CECIL SERIES.

By J. B. Hester; Better Crops with Plant Food, Vol. 35, No. 5, pp. 15-16 and 40. May 1951.

This article describes the Cecil soil series.

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LIME-INDUCED CHLOROSIS ON WESTERN CROPS.

By W. T. McGeorge; Better Crops with Plant Food, Vol. 35, No. 5, pp. 17-20 and 43-46. May 1951.

In a highly calcareous soil, its alkalinity, and the excess uptake of calcium contribute to a reduced iron activity in the root and aerial part of the plant, primarily the root. If ample active iron can be maintained in the plant the excess of calcium does not cause chlorosis. This may be accomplished by reducing the pH, the alkalinity, of the zone of contact between the root and the soil. The soils in which lime-induced chlorosis occurs contain too much CaCO_3 to attain a pH reduction throughout the entire soil mass. The obvious procedure then is to apply a sulfur-manure-iron sulfate mixture in

bands where a zone of low pH can be maintained.

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OKLAHOMA'S CONTESTS IN SOIL CONSERVATION.

By Harley A. Daniel; Better Crops with Plant Food, Vol. 35, No. 5, pp. 21-24. May 1951.

This article describes a contest of teaching soil conservation. It is designed to give farm people a new approach to farming the soil-conservation and land-improvement way.

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TESTS WITH BENZENE HEXACHLORIDE FOR THE CONTROL OF INSECTS ATTACKING PEANUTS, 1946-1949.

By F. W. Poos, T. N. Dobbins, E. T. Batten and G. M. Boush; USDA, ARA-BEPQ, E-820. May 1951.

In view of the off-flavor found in peanuts grown in soil treated with benzene hexachloride or lindane, the application of these insecticides to soil in which peanuts are to be planted immediately or in which peanuts are growing, is not recommended.

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GRASSLAND AGRICULTURE - A CHALLENGE TO ENGINEERS

By E. W. Hamilton; Agr. Eng., Vol. 32, No. 6, pp. 313-315. June 1951.

The grassland, hay lands and range lands of the entire United States cover more than a billion acres, nearly 60 percent of the total land area. Expansion and development of grassland areas to the fullest extent call for mechanized equipment, and even newer and better types than are available today, to keep pace with improved methods of developing the grassland program.

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THE HISTORICAL BACKGROUND OF RECLAMATION.

By Arson W. Israelsen; Agr. Eng., Vol. 32, No. 6, pp. 321-324. June 1951.

This article discusses reclamation as a world-wide three-phase, water-control program. The three phases are: (1) development, storage, conveyance, and use of water in irrigation; (2) protection of root-zone soils from excess water and construction of facilities to drain water-logged soil; and (3) prevention of soil erosion by control of rainfall and irrigation practices.

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FARM DRAINAGE - AN IMPORTANT CONSERVATION PRACTICE.

By P. W. Manson and C. O. Rost; Agr. Eng., Vol. 32, No. 6, pp. 325-327. June 1951.

This is a discussion of farm drainage as a valuable conservation practice which makes possible a farm-management program that will better conserve and improve soils and make better use of the water that falls on the farm. In addition, good farm drainage is a sound investment that pays substantial dividends in the form of increased yields and better land utilization.

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PRE-FABRICATED ASPHALT CANAL LINING.

The Asphalt Institute, Construction Series No. 89, Cobb. Stebbins Bldg., 1250 Stout St., Denver 4, Colorado. January 1951.

This paper describes a pre-fabricated, low cost canal lining for seepage control.

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SEEPAGE LOSS STUDIES ON PRE-FABRICATED ASPHALT CANAL LINING.

The Asphalt Newsletter, NL. No. 14, Cobb-Stebbins Bldg. 1250 Stout St., Denver 4, Colorado. May 1951.

The installation of pre-fabricated asphalt canal lining reduced seepage loss from 0.54 cu. ft. per sq. ft. per 24 hours to 0.056 cu. ft. on a 300 foot canal and from 0.72 cu. ft. to 0.04 cu. ft. on a 150-foot long canal.

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SEED PRODUCTION OF KY. 31 FESCUE AND ORCHARD GRASS AS INFLUENCED BY RATE OF PLANTING, NITROGEN FERTILIZATION, AND MANAGEMENT.

By J. T. Spencer; Ky. Agr. Exp. Sta. Bul. 554. June 1950.

Three types of seed-production experiments involving nitrogen fertilizer topdressings, various management practices, and broadcast versus row-seedings were conducted on sods of Kentucky 31 fescue and commercial orchard grass. The tests were made on the 1947, 1948, and 1949 seed crops.

The use of ammonium nitrate at the rate of 200 lb. to the acre approximately doubled the seed yields of both grasses in comparison with untreated plots. A 100-lb. rate of ammonium nitrate fertilization in general had little effect upon the yields of the first seed crop.

Early spring applications of nitrogen fertilizer were superior to autumn top-dressings for orchard grass seed while on fescue sods, autumn and spring applications were equally effective.

In the third year of the tests moderate clipping of the sods in the calendar year preceeding seed harvest resulted in a 50 percent reduction in seed yields as compared with unclipped plots. Burning the sod for 3 successive years had no pronounced effect on seed yields. The nitrogen top-dressings were as significant for forage production as for seed production. Row seedings were found to be highly superior to broadcast seedings for seed production.

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NITROGEN BALANCE IN LYSIMETERS AS AFFECTED BY GROWING KENTUCKY BLUEGRASS AND CERTAIN LEGUMES SEPARATELY AND TOGETHER.

By P. E. Karraker, Charles E. Bortner and E. N. Fergus; Ky. Agr. Exp. Sta. Bul. 557. September 1950.

During 11 years a lysimeter study was conducted on the Experiment Station farm at Lexington. The chief purpose was to study fixation of nitrogen by legumes grown alone and grown with bluegrass or balbo rye. The legumes used were korean lespedeza, white clover, red clover, and alfalfa. All treatments were in duplicate. Bluegrass also was grown alone and two lysimeters were uncropped.

The vegetation in cropped lysimeters, except those containing alfalfa and red clover, was clipped 2 to 3 inches high several times during the season and the clippings removed. Red clover was clipped usually 5 to 6 inches high and the clippings removed. Alfalfa was harvested for hay.

Fixation of nitrogen was less per lysimeter when a legume and nonlegume were grown together than where the legume was grown alone; chiefly, at least, because the nonlegume reduced growth of the legume. When considered in relation to the amount of legumes produced, fixation was considered in relation to the amount of legumes produced, fixation was considerably larger in the case of mixed growths than where the legumes were grown alone.

On the acre basis, 2,452 pounds of nitrogen were fixed during the 11 years where alfalfa was grown alone and 2,265 where korean lespedeza was grown alone. Smaller amounts were fixed in other lysimeters. The data showed about 33 pounds gain of nitrogen annually when bluegrass was grown alone, presumably due to nonsymbiotic nitrogen fixation. Where the legumes were grown alone the amount of nitrogen in the crops harvested was just as large as or larger than where they were grown with a nonlegume.

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EFFECTS OF CERTAIN CROPPING AND MANAGEMENT PRACTICES ON SOIL NITROGEN CONTENT.

By P. E. Karraker; Ky. Agr. Exp. Sta. Bul. 561.

March 1951.

Plots were sampled and soil nitrogen determined in 3-year crop rotation experiments on the Experiment Station farm at Lexington and on the Western Kentucky Substation farm at Princeton. Plots also were sampled at three outlying soil experiment fields - Campbellsville, Greenville, and Mayfield. Changes in soil nitrogen were determined in a 19-year period in the Lexington experiment and a 15-year period in the Princeton experiment. The sampling was made 25 years after establishment of the Campbellsville field and 31 years after establishment of the other two fields. Corn yields were reported as a measure of soil productivity.

Changes in soil nitrogen also were reported in a lysimeter experiment, and in two areas on the Experiment Station farm. One area has been in continuous cultivation and the other in bluegrass-white clover sod since 1903.

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THE EFFECT OF NITROGEN, PHOSPHORIC ACID POTASSIUM AND CHLORINE ON THE CAROTENE CONTENT OF THE CARROT.

By J. A. Freeman and G. Howell Harris; Sci. Agr., Vol. 31, No. 5, pp. 207-211. May 1951.

Addition of increasing amounts of nitrogen progressively increased the carotene content of carrots grown in Monroe silt loam soil. The addition of phosphorus and potash did not significantly affect the carotene content of carrots. The addition of chlorine was detrimental to the formation of carotene.

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FERTILIZERS AND ORGANIC MATERIALS IN MODERN SOIL MANAGEMENT.

By F. W. Parker; What's New in Crops and Soil, Vol. 3, No. 8, pp. 9-12 and 26. June-July 1951.

This article explains the place of fertilizers and organic materials in modern soil management programs.

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FIFTY YEARS OF PROGRESS IN THE SOUTH.

By O. E. Sell; What's New in Crops and Soil, Vol. 3, No. 8, pp. 18-20. June-July 1951.

This is a brief review of the progress made in the field of agriculture in the south during the past 50 years.

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FROM POVERTY GRASS TO 100-BU. CORN: TAKES JUST

10 MONTHS IN VIRGINIA.

By J. A. Lutz, Jr.; *What's New in Crops and Soil*, Vol. 3, No. 8, pp. 21 and 24. June-July 1951.

This article explains how, by the use of lime and fertilizer, land which had been producing poverty grass was turned into 100-bushels-per-acre corn land in 10 months.

DESIGN AND OPERATION OF ROCKY MOUNTAIN INFILTROMETER.

By E. J. Dortignac; USDA Forest Service, Rocky Mt. Forest and Range Exp. Sta., Fort Collins, Colo. Sta. Paper No. 5. February 1951.

This paper describes a modified infiltrometer which the author has used since 1946.

SOME METHODS FOR RELATING SEDIMENT PRODUCTION TO WATERSHED CONDITIONS.

By J. M. Rosa and M. H. Tigerman; USDA - Forest Service, Intermountain Forest and Range Exp. Sta. Ogden, Utah, Research Paper No. 26. May 1951.

This paper describes methods of relating existing sediment observations at stream gaging stations, reservoirs, and plots to broad classes, of plant cover and soil conditions on both large and small drainage basins. The procedure is illustrated for watersheds within both the Colorado and Columbia River basin with supporting observations on small streams and plots in Utah and Colorado.

SULFUR REQUIREMENTS OF SOIL FOR CLOVER-GRASS PASTURES IN RELATION TO FERTILIZER PHOSPHATES.

By J. R. Neller, G. B. Killinger, D. W. Jones, R. W. Bledsoe and H. W. Lundy; Fla. Agr. Exp. Sta. Bul. 475. April 1951.

The purpose of this investigation was to determine how different phosphate carriers relate to the sulfur requirements in the central, northern, and western parts of the state.

It was concluded that in widespread areas of central and north central Florida, clover and other legumes require annual fertilization with gypsum or some sulfur source. The experiments indicate that the soils of West Florida may be in a similar category but more data are needed before a specific recommendation can be given. Ordinary superphosphate supplies the gypsum. Other sources of phosphorus, such as finely ground rock phosphate, calcined phosphate, triple superphosphate and sometimes basic slag, must be supplemented with a source of sulfur for satisfactory

growth of clover in these areas. It is strongly possible that many non-leguminous crops likewise must be supplied with a source of sulfur for best growth.

EFFECT OF FINENESS OF AGRICULTURAL LIME UPON CROP RESPONSE.

By Franklin L. Davis; *Agron. Jour.*, Vol. 43, No. 6, pp. 251-255. June 1951.

A field study was made of the effectiveness of six different grades or degrees of fineness of agricultural limestone. All six grades of both limestone as well as C. P. calcium carbonate were applied at 1,500- and 3,000-pound per acre rates. The crops grown were crimson clover and sudan grass. The experiment was conducted for 7 consecutive years in small field plots on Norfolk loamy sand. It was found that:

1. The dolomitic lime produced the larger yields of crimson clover, while the calcitic lime produced the larger yields of Sudan grass.
2. The 4- to 10-mesh and 10- to 20-mesh materials of both limestones were inferior to the more finely ground materials. The 4- to 10-mesh materials produced, on the average, only one-half as much growth of crimson clover and Sudan grass as did the agricultural grade. The 10- to 20-mesh materials produced similar average yields approximately two-thirds as large as that produced by the agricultural grade.
3. The 60- to 100-mesh grade produced the largest 7-year average yields in more instances than any other grade.
4. The degree of fineness or standard recommended for agricultural limestone is 100 percent through a 10-mesh sieve and 50 percent through a 60-mesh sieve.

SOIL COMPACTION DETERMINATIONS WITH A SOIL PENETROMETER AS COMPARED WITH THE GEIGER COUNTER X-RAY SPECTROMETER.

By J. R. Watson, Jr., H. B. Musser, and C. D. Jeffries; *Agron. Jour.*, Vol. 43, No. 6, pp. 255-258. June 1951.

A high degree of relationship between the manner in which the Geiger Counter X-ray spectrometer and the roto-tiller soil penetrometer measures soil compaction was established. It was shown that as soil moisture content increased, and that as soil compaction increases, the penetrometer values, decreases, while the X-ray reflection intensities increase.

COMPARISON OF SUBSOILS AND SURFACE SOILS IN THE GREENHOUSE AS AN AID IN UNDERSTANDING AND RECLAIMING ERODED SOILS.

By R. M. Smith and G. G. Pohlman; Jour. of Agron. Vol. 43, No. 6, pp. 259-264. June 1951.

Bulk samples of fine subsoils and three surface soils were tested in pots in greenhouse at three different fertility levels. Test crops of barley, red clover, Korean lespedeza, Sudan grass and red clover were grown in succession.

It was concluded that greenhouse pot tests can be a practical help in obtaining a better understanding of the probable field performance of eroded soils and subsoils when the studies are properly correlated with results from the field and the laboratory.

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NITROGEN UPTAKE BY SOYBEANS AT SUCCESSIVE STAGES OF GROWTH.

By D. J. Lathwell and C. E. Evans; Agron. Jour., Vol. 43, No. 6, pp. 264-270. June 1951.

Soybeans resembling normal field grown plants were grown to maturity in sand cultures supplied with a nutrient solution in which the level of nitrogen was varied. The soybean plant did not accumulate enough nitrogen up to the mid-bloom stage to suffice for its subsequent growth. The data indicated that high levels of available nitrogen were necessary during the bloom period for maximum yields. The yield of beans was very closely correlated with the amount of nitrogen accumulated by the plant throughout the life cycle. There was little relation between the percentage nitrogen content of the plant and yield.

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CORN ROW SPACES AND CROP SEQUENCES.

By G. H. Stringfield and L. E. Thatcher; Agron. Jour., Vol. 43, No. 6, pp. 276-281. June 1951.

Difficulties in connection with the corn-wheat sequence in crop rotations with mechanized equipment are discussed.

Field experiments are reported involving widths of corn row space, the extreme range being 30 to 80 inches. Soil productivity differed greatly among the different tests with corn yields ranging from a maximum of 17 bushels of grain to the acre in the least productive field to a maximum of 114 bushels in the most productive field. Where the soil and season should produce less than 30 bushels of grain to the acre the yields dropped gradually as row spaces were wider than 30 inches. But with a soil and season that would produce 70 to 100 bushels of grain to the acre

there was no preceptible loss by widening the row spaces to 50 inches, a loss of only about 4 bushels at the 60-inch row space, and a loss of about 9 bushels at the 70-inch row space.

It is suggested that corn row spaces of 60 or even 70 inches without reducing the acre planting rate may permit farmers of the eastern United States (a) to follow a corn-wheat sequence with a full-season corn, to use a mechanical corn harvester and to sow wheat successfully and with reasonably efficient tools at an optimum date, and (b) to seed meadow crops successfully in corn.

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INDUSTRIAL MINERALS AND ROCKS AS PLANT NUTRIENT SOURCES.

By W. D. Keller; Maine Development Commission, Geological Survey, Report of the State Geologist, pp. 1-16. 1949-50.

Industrial minerals and rocks constituted most of the raw materials for the 750 million dollars worth of soil fertilizers sold in 1948. The demand for fertilizers is expanding. Hitherto unused rock products are potential sources of plant nutrients. Geologists will be better equipped to develop new and additional industrial rock sources as fertilizers when they understand the underlying requirements for soil rebuilders.

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GRASS SEED PRODUCTION ON IRRIGATED LAND.

By Harry F. Oman and Russell H. Stark; USDA Leaflet No. 300. May 1951.

It is impossible to predict seed yields except on a relative basis. Most grasses require high soil fertility for high seed yields. Seasonal weather conditions, especially extremes of high or low temperatures during the blooming period, reduce yields. When and how you irrigate and cultivate influences yields.

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BORDER IRRIGATION.

By Edwin J. Core; USDA Leaflet No. 297. May 1951.

Border irrigation is among the best methods for irrigating many crops on gentle slopes. It is an easy, economical, and efficient way to irrigate. You have excellent control of irrigation water at all times with a relatively small amount of labor. The method is widely used in "conservation irrigation".

Under the border system, fields are divided into strips between low ridges, or "borders". The

width of the strips varies with the kind of soil, land slope, crops grown, and the amount of water available. Each strip is irrigated by advancing a sheet of water from one end to the other. One man can usually irrigate several strips between borders at the same time. An important advantage of the border system is the excellent water control which you have at all times.

COMMUNITY GAINS FROM CONSERVATION FARMING.

By Vernon W. Baker; USDA, SCS, P. A. 146. May 1951.

Eight years of conservation farming have improved the stability of the agriculture and brought increased production to the farmers of the South Tillamook Soil Conservation District. Located in Oregon's most noted dairy area, famed for its Tillamook cheese, this District has increased its output of butterfat through steady gains nearly 15 percent from 1941 to 1948. This is a result of its program from better use of its land resources. During this same period, the part of Tillamook County outside the District has had a fluctuating, but declining, production, which by comparison has dropped a total of about 10 percent.

MORE TROUBLE ON THE RANGE.

By C. A. Fitzgerald; Farmer's Digest, Vol. 14, No. 11, pp. 1-5. March 1951.

Halogeton is a stockman's headache. It could, however, easily become one of our worst weeds nationally. Not enough is known about the weed to make any predictions as to what its natural limits might be in this country. It is closely related to the Russian thistle, and may be as adaptable. It has practically destroyed the sheep industry in the Raft River Valley in Idaho. Given a few more years of unrestricted spreading halogeton may well cover a large portion of the entire grazing area of the Snake River Valley.

Oxalic acid is the killer in halogeton. Late fall is the most dangerous season, but it has been known to kill sheep at other seasons as well. Oxalic acid precipitates the calcium in the blood.

Halogeton does not kill cattle as easily as sheep but it destroys their usefulness just the same.

LIST OF REFERENCES TO BORON LITERATURE REVIEWED OCTOBER-DECEMBER 1949.

By Library, Amer. Potash Institute, 1102 16th. Street, N. W., Washington 6, D. C. Mimeo. May

1951.
This is a list of publications dealing with the use of boron in agriculture.

THE EFFECT OF LAND USE PRACTICES ON ERODIBILITY OF SOIL BY WIND.

By W. S. Chepil, C. L. Englehorn, and A. W. Zingg; Kans. Agr. Exp. Sta. Agron. Dept. Contrib. No. 449. Mimeo. June 12, 1951.

Physical and chemical analyses of soil samples chosen at random from over 90 fields in Greeley county during 1949 and 1950 were made to determine the rates of soil deterioration that are associated with the type of agriculture employed since the breaking of the Virgin sod. It was found that land which had been devoted to grain production for 19 years had lost about 9 inches of topsoil, constituting all of the A horizon mainly by wind erosion. This land is now much less productive and contains substantially less organic matter and less undecomposed crop residues than newly broken land. Due to lower amounts of crop residue this "old" cultivated land is more exposed to erosion. The soil itself, however, is more resistant to erosion now than when it was first brought under cultivation, due to the presence at the surface of the finer textured and more structurally developed soil of the original B horizon. When the protective influence of crop residues was discounted, the old cultivated land was found to be less than half as erodible as land broken out of virgin sod between 1946 and 1948. With crop failures such as occur on all types of land in dry years, the recently broken land would apparently become most vulnerable to erosion by wind.

THE EFFECT OF PLANT RESIDUES AND CLOD STRUCTURE ON SOIL LOSSES BY WIND.

By C. L. Englehorn, A. W. Zingg and N. P. Woodruff; Kans. Agr. Exp. Sta. Agron. Dept. Contrib. No. 448. July 1951.

Tests were conducted in the field to determine the interrelationships of surface drag, surface roughness, plant residue cover, percent of soil material less than 0.42 mm. in diameter and soil loss obtained by means of a portable wind tunnel. The data obtained were analyzed according to standard multiple regression and correlation procedure and presented in terms of regression equations. The exponential regression equations provided a satisfactory expression of the functional relationships. Factors effecting variation in results between the different locations were cited.

The regression equation illustrate the effect of each factor on soil loss. On the basis of

relationships secured at three locations, an exponential equation approximating the results of the tests as a whole was developed. In this equation soil loss, X, in pounds per acre is shown to vary directly as the 2.5 power of the surface drag of the wind and to the 3.5 power of the percent of soil fractions less their 0.42 mm. in diameter. It varied inversely as the 0.8 power of the weight of surface residue. A simplified clod structure-residue index of soil loss wherein the surface drag of the wind is held constant at 3,000 pounds per acre, is presented.

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BUILDING BETTER PASTURES.

By Milo B. Tesar; Farmers Digest, Vol. 14, No. 11. pp. 30-36. March 1951.

Good pastures don't just happen. They are well planned. They are the result of using superior species like alfalfa, brome grass and Ladino clover as the backbone in crop rotations when managed like crops rather than wasteland, rotation pastures increase the yield of succeeding cash crops and insure a permanent, profitable grassland agriculture.

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WIDER USE OF WEED KILLERS.

By Farmer's Digest, Vol. 14, No. 11, pp. 55-57. March 1951.

Pre-emergence treatments with 2,4-D will control annual grasses and some tolerant broad leaved weeds such as purslane, which are not controlled well by post-emergence sprays. On loam soils and those of finer texture pre-emergence use of 2,4-D is satisfactory if applied 5 to 7 days after planting at rates of one to two pounds per acre. Pre-emergence applications are not recommended on sandy soils. Best results in spraying hard-to-kill perennials are obtained by treating during the actively growing stage-generally near the bud stage.

Small grain and flax seeded to Ladino clover, alsike, red clover, or alfalfa may be sprayed with the salts of 2,4-D at rates up to and including one-fourth pound per acre without serious loss to stand. Sweet clover should not be sprayed with 2,4-D.

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RENOVATION BOOSTS PASTURE YIELDS.

By J. B. Shepherd; Farmer's Digest, Vol. 14, No. 11, pp. 75-76. March 1951.

Renovation of old permanent dairy pastures at Beltsville, Maryland, in 1945 resulted in an average yearly increase of 35 percent in feed nutri-

ents during the next 5 years.

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THE INFLUENCE ON SOIL STRUCTURE OF THE "NATURAL ORGANIC MANURING" BY ROOTS AND STUBBLES OF CROPS.

By P. K. Peerlkamp; Fourth International Cong. Soil Sci., Proc. Vol. 1, pp. 50-54. Amsterdam. 1950.

This paper points out that for stabilizing or raising the structure level on arable land a periodical organic manuring is necessary and that in the Netherlands the "natural organic manuring" by roots and stubbles of cereals fills this need to a high degree. In this way all factors affecting the development of the root-system will influence soil structure.

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MOVEMENT OF MOISTURE IN UNSATURATED SOILS.

By E. C. Childs and N. C. George; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 60-63. Amsterdam. 1950.

The permeability at various moisture contents is calculated for two sands and one slate dust. These calculated permeabilities are found to be in good agreement with experimental results. The decrease of permeability as saturation with time is found to be done to the release of air from the water, with consequent pore blocking.

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EXPERIMENTAL DEMONSTRATION OF THE HYDRAULIC CRITERION FOR ZERO FLOW OF WATER IN UNSATURATED SOIL.

By L. A. Richards; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 66-68. Amsterdam. 1950.

In the Darcy equation, $V = ki$, the transission velocity, v , is equal to zero when the hydraulic gradient, i , is equal to zero. The tension head, hydraulic head, and hydraulic gradient are defined and instruments suitable for their measurement described in a column of soil containing water at field capacity. Static equilibrium under gravity was attained in 135 days in the lower section when the column was vertical. Changes in the hydraulic head and hydraulic gradient for attainment of a new zero flow equilibrium are shown when the column is rotated to the horizontal position.

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INTERACTION BETWEEN THE EXCHANGEABLE IONS AND THE ADSORBED WATER LAYERS IN MONTMORILLONITE.

By Erik Forslaid; Fourth International Cong.

Soil Sci. Proc., Vol. 1, pp. 110-113. Amsterdam. 1950.

The interaction mechanism between the exchangeable ions and the water lattice, assuring a crystalline structure of the water adsorbed on montmorillonite is considered from the wave-mechanical point of view. The experimental work carried out to test the validity of the theoretical predictions is discussed.

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THE DIRECT DETERMINATION OF IONIC ACTIVITY PRODUCTS OR RATIOS IN SOILS.

By E. W. Russell and G. A. Cox; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 138-141. Amsterdam 1950.

A series of electrodes, each sensitive to a different ion has been constructed and the conditions under which they can be used in soils have been found. Electrodes have been made for calcium, manganese, aluminum, iron and zinc and in not too acid soils magnesium.

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THE INFLUENCE OF CULTURAL PRACTICES ON THE NUTRIENT UPTAKE OF APPLES.

By C. Bould; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 262-265. Amsterdam 1950.

Cultural practices employing the use of permanent grass, white clover, annual cover crops and clean cultivation designed to investigate the influence on soil fertility and the nutrient uptake of apples are described. They had a significant effect on the uptake of nitrogen, phosphorus and potassium as measured by leaf analysis. Permanent grass and clover, increased the uptake of potassium and phosphorus, and decreased the uptake of nitrogen and magnesium as compared with annual cover crops and clean cultivation.

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A "SAWAH" PROFILE NEAR BOGOR, JAVA.

By F. F. R. Koenigs; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 297-300. Amsterdam 1950.

In profiles of irrigated rice fields near Bogor a hardpan formed by a layer rich in iron hydroxides and manganese oxides occurs under the ploughpan. Reduction of these compounds in the topsoil during the season that rice is grown and oxidation in the subsoil are the causes of this development which may be regarded as an inverted gley process.

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PRODUCTIVITY RATINGS.

By G. R. Clarke; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 345-348. Amsterdam 1950.

Studies were carried out to compare yields of wheat against an evaluation of the physical properties of the soil profile. The formula $P = C \cdot V \cdot G$ where P is yield of grain, C constant, V the value of texture and G the drainage factor, has been statistically proved to be satisfactory under the condition of the experiment.

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GROWTH FACTORS AND SOIL PRODUCTIVITY.

By Th. J. Ferrar; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 348-352. Amsterdam 1950.

The possibility exists to get an exact idea of the influence of each factor on the soil productivity by means of the multifactor-analysis. At the same time a synthesis of all growth factors is the result. From the results justified conclusions can be drawn about the soil evaluation; land-use planning and all the measures that must be taken for soil improvement.

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SOIL PRODUCTIVITY RATINGS.

By J. Kenneth Ableiter and C. P. Barnes; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 360-364. Amsterdam 1950.

The potential productivity of well defined local soil types can be expressed in terms of predicted yields of individual adapted crops under alternative physically defined systems of management.

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CHANGES IN SOIL PERMEABILITY AND EXCHANGEABLE CATION STATUS DURING FLOW OF DIFFERENT IRRIGATION WATERS.

By G. B. Bodman and Milton Fireman; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 397-400. Amsterdam 1950.

The effect of long-continued irrigation of soil-columns with salt-free water, and with water salinized by the addition of calcium and sodium chlorides, was examined with respect to changes in permeability and exchangeable cation status of the soils.

Similar patterns of permeability changes were observed regardless of salt concentration and cationic ratios, namely: (a) high initial permeability, (b) minimum permeability, (c) maximum permeability. This experience was followed by

(d) a period of long, rather slow, decline in permeability.

CHEMICAL EFFECTS OF SALT-TOLERANT SHRUBS ON SOILS.

By Ray C. Roberts; Fourth International Cong. Soil Sci. Proc., Vol. 1, pp. 404-406. Amsterdam 1950.

Data from several hundred field tests, supplemented by some laboratory analyses, show clearly that desert shrubs, like grass in the Chernozem region and trees in the Podzol region have a pronounced effect in soil development. These results emphasize the need for extreme care in the collection of soil samples to be studied in the laboratory as a basis for making predictions about the suitability of soils under desert shrubs for irrigation.

SOIL MOISTURE AND EVAPORATION.

By R. K. Schofield; Fourth International Cong. Soil Sci. Trans., Vol. 2, pp. 20-28. Amsterdam 1950.

The evaporation of water from transpiring vegetation can be evaluated with considerable precision. There is, in fact, no quantitative relationship between transpiration and the production of dry matter. There are very strong indications that maximum evaporation is mainly controlled by the weather, and only influenced to a very small extent by the nature of the vegetation, so long as it is in an active growing phase.

A TENTATIVE METHOD FOR THE DETERMINATION OF THE BASE EXCHANGE CAPACITY OF CLAYS.

By H. Van Olphen; Fourth International Cong. Soil Sci. Trans., Vol. 2, pp. 97-99. Amsterdam 1950.

Although every practical and theoretical aspect of the bromide method for the determination of the base exchange capacity of clays has not yet been fully investigated, its extreme simplicity and its applicability to small amounts of clay warrants fuller consideration of its merits.

RAPID DETERMINATION OF TOTAL ORGANIC MATTER IN SOILS BY CERIOMETRY.

By J. De La Rubia Pacheco and F. Blasco Lopeg-Rubio; Fourth International Cong. Soil Sci. Trans., Vol. 2, pp. 101-104. Amsterdam 1950.

This paper describes the application of ceriometric techniques to the rapid determination of total organic matter in soil.

AN ELECTRICAL METHOD OF SAMPLING SOIL FOR EARTH-WORMS.

By J. Doekson; Fourth International Cong. Soil Sci. Trans., Vol. 2, pp. 129-131. Amsterdam 1950.

This is a description of a method of estimating the number of earthworms in the soil by means of an electrical equipment without digging or the use of chemicals.

THE PROBLEM OF RADIATION DAMAGE IN FERTILIZER STUDIES WITH LABELLED PHOSPHATE.

By R. Scott Russell, R. P. Martin and S. N. Adams; Fourth International Cong. Soil Sci. Trans., Vol. 2, pp. 138-141. Amsterdam 1950.

Investigations must be continued on a considerably larger scale before the extent to which radiation effects limit the use of P^{32} in field studies of crop responses to different phosphate fertilizers can be fully assessed. It has, however, been demonstrated that the question has hitherto been insufficiently considered, and that experimental results must be regarded as of questionable validity unless the absence of significant radiation effects has been established by critical physiological studies of both shoots and roots.

PERIODICAL FLUCTUATIONS OF SOIL FERTILITY AND CROP YIELDS.

By F. Vander Paauw; Fourth International Cong. Soil Sci. Trans., Vol. 2, pp. 151-155. Amsterdam 1950.

A remarkable experience of soil investigation consists in the variations observed after repeating the sampling of the same spot. The deviations are considerably larger than may be expected from the known errors of sampling and analysis. Influences of season play a part in this respect. It is plausible to suggest that rhythmic variations of climate would be responsible for the periodicity observed. A periodicity in crop yields and soil fertility factors with a period of about 4-5 years may be expected.

SOME PALEOSOLS OF PUERTO RICO.

By Clifford A. Kaye; Soil Sci., Vol. 71, No. 5,

pp. 329-336. May 1951.

This paper brings up certain questions of soil genesis. Does it follow, for example, that two different soils found not too far apart owe their differences to current conditions of soil formation as is so often assumed in pedology? The geologist wonders why past time is not an important factor in soil formation. He is also inclined to speculate on whether enough weight is given by pedologists to other inherited characteristics of soils. This paper raises the question of whether laterization is a soil-forming process that acted with greater effectiveness in the past than it does today.

SOME APPLICATIONS OF WATER-DROP STABILITY TESTING TO TROPICAL SOILS OF PUERTO RICO.

By R. M. Smith and C. F. Cerhuda; Soil Sci., Vol. 71, No. 5, pp. 317-345. May 1951.

Soil aggregate stability testing in Puerto Rico has shown that the original McCalla method can not be generally used because it readily destroys only relatively weak aggregates, mostly those from the less stable subsoils.

APPLICATION OF PAPER CHROMATOGRAPHY TO IDENTIFICATION AND QUANTITATIVE ESTIMATION OF AMINO ACIDS IN SOIL ORGANIC MATTER FRACTIONS.

By Doreen I. Davidson, F. J. Sawden, and H. J. Atkinson; Soil Sci., Vol. 71, No. 5, pp. 347-352. May 1951.

A paper partition chromatographic technique was adapted to the qualitative and semiquantitative estimation of amino acids in soil organic matter. The method is relatively fast and the determination can be made on 2 grm. or less of the organic material, provided the amino-N content is greater than 0.5 percent.

ASCORBIC ACID AND ASCORBIC-ACID-OXIDIZING ENZYMES OF MANGANESE-DEFICIENT SOYBEAN PLANTS GROWN IN THE FIELD.

By Katharine J. Hivon, D. M. Doty, and F. W. Quackenbush; Soil Sci., Vol. 71, No. 5, pp. 353-359. May 1951.

Soybeans were grown for three successive years on experimental plots having a history of manganese deficiency. Typical, severe manganese-deficiency symptoms of chlorosis and retarded growth were noted in the untreated plants during only the third year.

No consistent relationship was found between

manganese nutrition of the plant and ascorbic acid content of the leaves. A small, seemingly, consistent inverse relationship between manganese nutrition and ascorbic-acid-oxidizing enzyme activity of the leaves is not conclusive.

IMPORTANCE OF SOIL ORGANIC AND INORGANIC PHOSPHORUS TO PLANT GROWTH AT LOW AND HIGH SOIL TEMPERATURES.

By M. T. Eid, C. A. Black, and O. Kempthorne; Soil Sci., Vol. 71, No. 5, pp. 361-370. May 1951.

This is a preliminary report on two tests of the hypothesis that soil organic phosphorus is of importance in the phosphorus nutrition of plants. The first test involves the regression of soil phosphorus availability to plants on certain organic and inorganic soil phosphorus fractions, and the second test involves the change of regressions with soil temperature.

NUTRITION OF PLANTS CONSIDERED AS AN ELECTRICAL PHENOMENON - A NEW APPROACH.

By Edward L. Breazeale, W. T. McGeorge, and J. F. Breazeale; Soil Sci., Vol. 71, No. 5, pp. 371-375. May 1951.

This paper presents evidence in support of the theory that ion absorption by plants is an electrical phenomenon. Cation uptake is shown to be a function of the electrical potential of the specific ion.

Ions are mobile and probably absorbed and transported in response to an electrical impulse created by a vital impulse within the plant. An experimental technic is presented to show how the Fisher electropode can be used in a study of ion absorption by plants.

AN ALINEMENT CHART FOR USE WITH THE FIBERGLASS SOIL-MOISTURE INSTRUMENT.

By Nedaria Bethlahmy; Soil Sci., Vol. 71, No. 5, pp. 377-380. May 1951.

This paper discusses the alinement chart prepared for use with the fiberglass soil-moisture instrument or Colman meter.

INFLUENCE OF THE SILICATE ION ON POTASSIUM FIXATION.

By M. M. Mortland and J. E. Giesecking; Soil Sci., Vol. 71, No. 5, pp. 381-385. May 1951.

A X-ray diffraction study showed that montmorillonitic clays dried with K_2SiO_3 were changed to micalike minerals. Kaolinitic minerals when dried with K_2SiO_3 fixed insignificant amounts of potassium.

The illitic clay minerals fixed large amounts of potassium which could not be removed with boiling KNO_3 . The illitic clays were found to vary in their capacity to fix potassium from K_2SiO_3 .

Wyoming bentonite fixed intermediate amounts of potassium. Since the boiling $N HNO_3$ treatment is rather drastic, it must be concluded that the illitic and montmorillonitic clays fix potassium from K_2SiO_3 in a tenacious form.

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FACTORS AFFECTING THE MOLYBDEUM CONTROL OF PASTURE PLANTS: II. EFFECT OF SOLUBLE PHOSPHATES, AVAILABLE NITROGEN, AND SOLUBLE SULFATES.

By Isaac Barshad; Soil Sci., Vol. 71, No. 5, pp. 387-398. May 1951.

The uptake of molybdate ions was stimulated by the presence of soluble phosphates, particularly in acid soils, available nitrogen, possibly as ammonium ions, on the otherhand, retarded the uptake of molybdate ions. A decrease of soluble soil carbonates and hydroxyl ions by treatment with gypsum, sulfuric acid, or sulfur resulted in an increase in the molybdeum content of plants.

The enhancing or retarding effect of soil treatments on the uptake of molybdeum by plants is explained as resulting from both a soil effect and from a physiological response of the plant. Means are suggested for producing, in high molybdeum soils, pasture plants the molybdeum content of which would be within permissible limits for cattle consumption.

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BEAVER BOOM.

By Earle Doucette; Amer. Forests, Vol. 57, No. 6, pp. 14-16 and 36. June 1951.

Maine is harvesting profits - and problems - from its prolific little fur-bearing dam builders.

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SOME FACTORS RELATED TO THE GROWTH OF LONGLEAF PINE IN THE ATLANTIC COASTAL PLAIN.

By Charles W. Ralston; Jour. of Forestry, Vol. 49, No. 6, pp. 408-412. June 1951.

To determine the factors related to site quality, 303 areas of longleaf pine growing in the

Atlantic coastal plain were examined. The vegetation on each area was tallied, and height and age of the dominant trees were measured. Soil profiles were described and identified, and samples were drawn from each horizon encountered. Laboratory analysis provided estimates of the moisture equivalent, xylene equivalent, and "silt plus clay" content of the subsoil.

Statistical analysis of the data by regression methods indicated that age of stand, moisture equivalent of the "B" horizon, depth of mottling, stand density, turpentine, and latitudinal distribution were significantly related to height growth of longleaf pine.

A rapid field method for estimating site quality of coastal plain soils for longleaf pine is discussed.

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PLANNING FOR WILDLIFE ON A MANAGED FOREST.

By Kenneth A. Reid; Jour. of Forestry, Vol. 49, No. 6, pp. 436-439. June 1951.

This paper discusses the wildlife program adapted for 96,000 acre park in the Adirondacks.

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MOVEMENT OF PRECIPITATION WATER IN THREE PROFILES OF SOILS AFTER A PERIOD OF DROUGHT.

By G. Demortier and G. Droeven; Bull. Inst. Agron. et Stat. Recherches de Gembloux (Belgium) Vol. 18, Nos. 102, pp. 53-67. 1950.

This is an account of a systematic study of the precipitation of rain water into three different soil profiles, in autumn and winter 1949-50, starting after summer of 1949 marked by a period of drought. The results show the effect of the clay-content and physical structure on the depth of water percolation and its action on the yield of crops. A short statement is included concerning the upward motion of water in soil under the action of frost.

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LET'S TAKE A LOOK AT THE SOUTHERN HIGH PLAINS.

By H. H. Finnell; Soil Conservation, Vol. 17, No. 1, pp. 3-4 and 22. August 1951.

The breaking out low-capability lands has resulted in the development of a little Dust Bowl southwest of Lubbock, Tex., and the development of wind-erosion hazards in the arid margins of the wheat belt. These soils are destined for early enforced abandonment or voluntary retirement to grass.

A near crop failure last year followed by a complete failure this year increased the prospects

of dust storms from the marginal wheat areas next year. Land deprived of crop residues two years in succession is certain to blow persistently unless remedied by an immediate - 1951 - change from wheat to sorghum. Summer fallow under present conditions only makes the blowing worse, and cannot assure a wheat crop.

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RADIOACTIVE FERTILIZERS.

By L. B. Nelson; The Reclamation Era, Vol. 37, No. 7, pp. 134-135 and 147. July 1951.

This is a brief summary of the results obtained from the use of radioactive phosphorus in the western states. It has been found that in any one season crops actually use only a small amount of the fertilizer phosphorus applied. This seldom exceeds 12 to 15 percent, even on low-phosphorus soils. On the other hand, the more phosphorus there is available in the soil, the more soil phosphorus the plant uses. Superphosphate, ammonium phosphate, and phosphoric acid have proven to be the best sources of phosphorus under most conditions. Plants usually get the most out of fertilizers during the early stages of growth, if you apply the phosphate close to the seed. Later in the season, the most effective method is to use a 4-inch drill and place the phosphate in strips beside or around the plants. Phosphate at depths of 4 inches usually is most effective. In general, plants use much more fertilizer phosphorus from soil which is kept moist through more frequent irrigations than from drier soil having fewer irrigations.

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PARTIAL LIST OF NEW HERBICIDES AND NEW USES FOR OLD ONES.

By G. F. Warren; Purdue Univ., Lafayette, Ind. Mimeo. 1951.

This publication lists a number of new weed killers as well as a number of the old ones, gives their abbreviation or brand name, type of action, and outlines their possible uses.

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RECENT RESEARCH IN BRUSH CONTROL.

By J. W. Suggitt; The Hydro-Electric Power Com. of Ontario, Research Div. Paper presented at the Nat. Meet. and Convention of the Agr. Inst. of Canada. Winnipeg. June 28, 1951.

Control of woody brush growing along power-line right-of-way by means of growth-regulating chemicals was first investigated by the Commission in 1947. During the past four years a continuing program of applied research and development with herbicides has indicated that suitable chemical

treatment can be an economical and permanent answer to the brush-control problem.

This paper makes no attempt to summarize the results of large-scale treatments as conducted by the Commission's Forestry Section, but is confined to an account of the development work of the Research Division. Few of the data obtained during the research are included, but a few generalized conclusions that arose from the work are presented.

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EFFECT OF METHOXONE ON YOUNG COTTON PLANTS.

By Wayne J. McIlrath; Texas Agr. Exp. Sta. Prog. Rpt. 1377. June 8, 1951.

Although this report is based on a very limited number of observations, it is evident that the amount of Methoxone required to cause injury to young cotton plants is very small. Also, in spite of the fact that cotton is somewhat less sensitive to this material than it is to 2,4-D, within the normal range of herbicidal dosages, Methoxone will cause severe damage to this crop.

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BARNYARD MANURE AND COTTON BURS AS A DRYLAND FERTILIZER FOR COTTON.

By D. L. Jones; Tex. Agr. Exp. Sta. Prog. Rpt. 1379. June 13, 1951.

Where barnyard manure was applied at the rate of 2, 4 and 8 tons per acre for 5 consecutive years, and the land cropped to cotton for 10 years, the total increase of lint cotton was 230, 477 and 620 pounds, respectively. For the 2-ton application of cotton burs, the increase totaled 195 pounds for the 9 years. The 2, 4 and 8-ton application of barnyard manure gave a yearly increase of 23, 24 and 22 pounds of lint per ton applied, respectively. The 2 tons of cotton burs gave 24 pounds.

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POSSIBILITIES OF CONTROLLING ANNUAL WEEDS IN SEED ONIONS BY CHEMICAL METHODS INDICATED BY EXPERIMENTS.

By F. L. Timmons, L. R. Hawthorn, and R. D. Weber; Utah Agr. Exp. Sta. Farm and Home Sci., Vol. 12, No. 2, pp. 21-22 and 38-39. June 1951.

The possibility of controlling late emerging weeds in seed onions by chemical methods is pointed to by results of recent experiments.

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ALFALFA SEED GROWERS OF UTAH SHOULD PROTECT THEIR WILD BEES.

By George E. Bohart; Utah Agr. Exp. Sta. Farm and Home Sci., Vol. 12, No. 2, pp. 32-33 and 37. June 1951.

Cross-pollination of alfalfa, which is essential for seed production, is accomplished by many species of wild bees. Since most of these wild species visit alfalfa primarily for pollen, they trip and thus cross-pollinate most of the flowers they visit. Bee for bee they pollinate alfalfa more efficiently than do honey bees, which more often than not visit the flowers only for nectar and avoid the tripping mechanism. Moreover, many of the wild bees, such as the leaf cutters and bumble bees, seem to have a special knack for gathering alfalfa pollen and trip more flowers per minute than do pollen-collecting honey bees.

FURTHER EVIDENCE OF ANTIBIOTICS FROM UTAH SOILS.

By Reed J. Olsen and Kenneth R. Stevens; Utah Agr. Exp. Sta. Farm and Home Sci., Vol. 12, No. 2, pp. 34-35 and 40. June 1951.

Disease-producing germs, with a few exceptions, do not persist long in the soil. This is owing to the interrelationships between the pathogens and the non-disease-producing organisms. Organisms that live together affect each other favorably, indifferently, or antagonistically. Antagonisms between disease-producing organisms and non-disease-producing organisms eventually result in the eradication of disease germs foreign to the soils or water basins they contaminate. These non-pathogenic microorganisms keep our world clean and provide us indirectly with food, but they also help us fight disease. Streptomycin, penicillin, and aureomycin are examples of disease-combating agents produced by these soil organisms.

This paper presents results obtained from recent studies showing the relation to additional non-disease producing organisms of the soil to the control of certain plant diseases.

DOLLARS AND SENSE IN CONSERVATION.

By S. V. Ciriacy-Wantrup; Calif. Agr. Exp. Sta. Cir. 402. January 1951.

This circular is intended for the farmer who is interested in conserving his farm and the natural resources of his country. It does not tell how to lay out a contour orchard, or prevent gullies, or reseed a range. Rather, it analyzes what a farmer must consider when he decides whether such practices will pay. It is intended to help him adjust his conservation decisions to changes in economic forces. It shows that if needed conservation practices do not pay, the reasons are

often man-made, and can be changed. And it suggests practical steps to make dollars and sense work for conservation. Some of these steps are ones a farmer can take in cooperation with his neighbors, his banker, or his landlord. Others require public action. Farmers as a group have a powerful voice in shaping public conservation policy. If they understand what is needed, they can, through their representatives and organizations, help to bring about changes that will conserve their own and the nation's resources.

HARVESTING AND CLEANING GRASS AND LEGUME SEED IN THE WESTERN GULF REGION.

By Simon E. Wolff; USDA, SCS, Texas Agr. Handbook No. 24. June 1951.

This handbook is an enlargement of Agronomy Memorandum No. 56, Western Gulf Region. Some of the introduced legumes and grasses included are relatively new in use.

All plants under Discussion of Species are arranged in alphabetical order according to scientific names. An alphabetical list of common names is also given to aid the reader in locating the desired plant in the text and on the plates. Plates are arranged in numerical order; plants are arranged on the plates in alphabetical order according to their scientific names.

BERMUDA GRASS RESEARCH IN TEXAS.

By E.C. Holt, R. C. Potts and J. F. Fudge; Tex. Agr. Exp. Sta. Cir. 129. April 1951.

This circular brings together the results of research with Bermuda grass in Texas up to 1950. Bermuda grass is the most important pasture grass in the South, but in cultivated fields it often becomes noxious and is a weed. Coastal, an improved strain, has proved to be superior to Common Bermuda grass. Coastal is a tall, non-seeding strain.

Bermuda grass grows well on many soil types, but does best on fertile soils. It responds readily to fertilization, especially nitrogenous fertilizers. Bermuda compares favorably with other warm season grasses in chemical composition. It is highly nutritious and palatable at stages of growth up to early maturity, but the protein content may drop below the minimum requirement when it matures. Protein contents of 5 to 12.5 percent were reported for common, depending on the stage of growth. The protein content of coastal was increased from 8.5 up to 12 percent by nitrogen fertilization. The phosphorus content of the forage may be low when the phosphorus content of the soil is low, but with the addition of phosphorus to the soil, the phosphorus content of the

plant increases. The lime content ordinarily is above the minimum requirement.

Because of its stoloniferous nature, Bermuda will withstand closer grazing than most other grasses. Yields depend largely on fertility and moisture. Annual yields of 3,500 pounds of air-dry forage per acre for common Bermuda and 4,600 for coastal are reported on fertile Brazos River Valley soil which received 80 pounds of nitrogen per acre. Coastal, grown on Lufkin soil near College Station, produced 2,200 pounds of dry forage without fertilizer and 7,000 pounds when 200 pounds per acre of nitrogen were applied.

Common Bermuda grass can be established by seed or by vegetative material. Coastal, which does not produce viable seed, must be propagated vegetatively. Bermuda is an excellent permanent pasture grass for East and South Texas, the Blackland and will grow on alluvial or bottom-land soils west of the 30-inch rainfall belt.

AGRICULTURAL PROGRESS THROUGH RESEARCH - 63rd ANNUAL REPORT, ORGANIC MATERIALS.

By W. B. Kemp; Md. Agr. Exp. Sta. Bul. A-62, pp. 31-32. July 1, 1949 - June 30, 1950.

In tests to find the best materials for heavy organic residues, the delayed plowing continued to give outstanding yields of high quality tobacco. Tobacco yields and values were usually good, considering that the crop was grown with only 7 inches of rainfall. Tobacco grown following early or normal turning under of vetch grown in mixtures with wheat, rye or ryegrass gave an increase of \$250 per acre compared with tobacco grown following no cover. By turning these same cover crops under one month later, another \$150 per acre was added to the value of the tobacco crop.

Ryegrass alone gave only a moderate increase in crop yield and value over no cover crop. Late turning of the ryegrass caused some reduction in crop yield and total value. Vetch alone greatly increased the crop yield when turned under late; however, the quality of the tobacco was poor. Vetch grown in mixtures with wheat, rye, or ryegrass gave heavy yields of high quality tobacco. Late turning of these mixtures gave better yields, but in some cases the quality was slightly poorer. The quality may have been hurt by having too much vetch in the mixture.

Planting and cultivating with machinery has often been difficult following late turning of this coarse organic matter. During the 1950 season all plots with heavy green manure crops were disced thoroughly with a weighted disc before plowing. The cutting and mixing eliminated most of the objectionable features of coarse organic matter. All machine planting and culti-

vation was done with good results.

THE EFFECT OF CALCIUM AND SOIL pH ON NODULATION OF *T. SUBTERRANEUM* L. CLOVER ON A YELLOW PODSOL.

By D. Spencer; Australian Jour. of Agricultural Research, Vol. 1, No. 4, pp. 374-381. 1950.

The mechanism of the action of lime in stimulating nodulation of subterranean clover on some soils of the Southern Tablelands of New South Wales was studied in pot experiments. Increased soil pH or increased calcium supply alone did not markedly improve nodulation. With a combination of both these factors, excellent nodulation resulted.

Nodulation was shown to be increased by increasing the amount of the inoculum of *Rhizobium* added with the seed. It was also increased if the moisture content of the soil was maintained continually at field capacity.

DIFFERENTIAL EFFECTS OF CERTAIN PHENOXYACETIC ACID COMPOUNDS AND PHENYL CARBAMATES ON PLANT SPECIES. II. EFFECT OF FOLIAGE APPLICATIONS WITH SPECIAL REFERENCE TO YIELDS OF WHEAT.

By R. M. Moore; Australian Jour. of Agricultural Research, Vol. 1, No. 4, pp. 401-412. 1950.

The effects of foliage sprays of various phenoxyacetic acid derivatives and of isopropyl *n*-phenyl carbamate on a dicotyledon, *Phaseolus vulgaris*, were compared. The carbamate was without effect and although all phenoxyacetic acid compounds were markedly toxic, they differed in the rapidity of their action.

Wheat exhibited differential responses to phenoxyacetic acid compounds and to isopropyl phenyl carbamate at different growth stages. Applications of four phenoxyacetic acid compounds to wheat at different stages of development, from late seedling to flowering, showed that grain yields were reduced most markedly by applications in the seedling stage; the butyl ester and amine salt of 2,4-dichlorophenoxyacetic acid were more toxic than the sodium salt.

One tenth percent, foliage sprays of isopropyl phenyl carbamate had no effect on wheat in the late seedling or tillering stages, but severely depressed the yield of grain when applied at flowering. Barley responded similarly. Higher concentrations applied to wheat at pre-shooting also reduced grain yields.

Flax, although susceptible to pre-emergence treatment, was not affected by foliage sprays of isopropyl phenyl carbamate at any growth-stage. One tenth percent applications of 2,4-D acid as

the sodium salt reduced flax yields only when applied at the seedling stage.

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THE GLOBAL DISTRIBUTION OF TRIBES OF THE GRAMINEAE IN RELATION TO HISTORICAL AND ENVIRONMENTAL FACTORS.

By W. Hartley; Australian Jour. of Agricultural Research, Vol. 1, No. 4, pp. 355-373. 1950.

An extensive survey of the literature on grass distribution throughout the world was made to determine the average percentage of species of each of the major grass tribes in the total grass flora.

These average percentages for the six largest tribes are as follows:

Agrostaeae	8.3 percent
Andropogoneae	11.9 percent
Aveneae	6.3 percent
Eragrostaeae	8.1 percent
Festuceae	16.5 percent
Paniceae	24.7 percent

The distribution of each of the above tribes is shown on world maps, and the relationship of this distribution to climatic, historical, and taxonomic factors is discussed.

It is shown that the present distribution of each of the major tribes can be explained by a few readily recognizable factors.

Climatic factors are of primary importance in relation to grass distribution and winter temperature has special significance.

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RAINFALL FREQUENCY: AN ASPECT OF CLIMATIC VARIATION.

By Luna B. Leopold; Trans. Amer. Geo. Union, Vol. 32, No. 3, pp. 347-357. June 1951.

Analyses which have been made in the past have shown no significant trend in annual values of rainfall during the period of rainfall records in the southwestern United States. In the present study, frequency of daily rains of various sizes are analyzed for four long-record stations in New Mexico. It is shown that the frequency of rains smaller than 0.50 inch in a day progressively increased from 1850 to about 1930. Opposite trends in different size classes tended to partially compensate one another in such a way that trends do not appear in the annual rainfall totals. Frequency of rains of various sizes comprising wet years and dry are compared. Some effects of changes in rainfall frequency on vegetation and erosion are discussed.

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A MIXING-LENGTH THEORY OF TIDAL FLUSHING.

By Arnold B. Arons and Henry Stommel; Trans. Amer. Geo. Union, Vol. 32, No. 3, pp. 419-421. June 1951.

The salinity distribution in an idealized estuary where mixing is predominantly due to the tides is computed, using an eddy diffusivity based on the distribution of tidal currents and excursions. Comparison is made to the salinity distribution in real estuaries.

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POROSITY FACTOR FOR CASE OF LAMINAR FLOW THROUGH GRANULAR MEDIA.

By Joseph B. Franzini; Trans. Amer. Geo. Union, Vol. 32, No. 3, pp. 443-446. June 1951.

The resistance coefficient of flow through granular media depends on the porosity of the medium as well as the Reynolds number of the flow. There is disagreement as to the functional relationship between porosity and resistance coefficient, hence a series of carefully conducted permeability tests was made on randomly packed and systematically packed media using a variable head permeameter. The test results indicated that the relationship between porosity and resistance coefficient for laminar flow through granular media is represented best by the Fair-Hatch expression $(1A)^2/a^3$ when compared with other factors that appear in the literature.

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AN IMPROVED SOIL-MOISTURE MEASURING UNIT FOR HYDROLOGIC STUDIES.

By R. E. Yodder and F. R. Dreibelbis; Trans. Amer. Geo. Union, Vol. 32, No. 3, pp. 447-449. June 1951.

A fiberglass gypsum-block soil-moisture unit is described for measuring soil moisture under field conditions from saturation to the wilting point. A sketch of its design and its advantages over other units is presented. The gypsum block serves as a good buffer and contact with the soil, and the fiberglass serves to furnish reliable data in the wet range which the gypsum block alone does not give. It is especially recommended for hydrologic studies where a knowledge of soil-moisture conditions from field capacity to saturation is desirable.

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NITRATE IN THE GROUND WATER OF TEXAS.

By William O. George and Warren W. Hastings; Trans. Amer. Geo. Union, Vol. 32, No. 3, pp. 450-456. June 1951.

Ground water in many parts of Texas contains nitrate in excess of 20 ppm as NO_3 . About 3,000 of the 20,000 nitrate determinations made of water from wells in Texas showed more than 20 ppm of nitrate. The public water supplies of 27 Texas towns and cities contained more than 50 ppm of nitrate. Recent medical research indicates that methemoglobinemia or infant cyanosis ("blue babies") may be caused by nitrate in water used in formula mixtures. Most of the high nitrate in ground water is found in wells less than 200 ft. deep and mainly in water from late Tertiary and Quaternary formations; however, high nitrate was found in water from all kinds of rocks of all ages. The presence of high nitrate in ground water appears to be unrelated to rainfall, geography, or cultivation.

A hypothesis of bacterial origin of the high nitrate is supported by strong evidence but is weakened by the presence of the correspondingly high content of associated salts. The disappearance of nitrate at depth presents additional problems.

EFFECT OF PRESENT INSTALLATION PRACTICES ON DRAINTILE LOADING.

By Jan Van Schilfgaarde, R. K. Frevert and W. J. Schlick; Agr. Eng., Vol. 32, No. 7, pp. 371-374, and 378. July 1951.

This paper deals with three aspects of the problems of tile loading, i.e., the Morton formulas for loads on underground conduits are presented so that they can be solved with a minimum of calculations, the probable loads to which tile may be subjected, and the effect of bedding conditions on the supporting strength of the tile.

A GRAPHIC METHOD OF FINDING THE DEPTH OF IRRIGATION WATER APPLIED.

By Javes E. Gaston; Agr. Eng., Vol. 32, No. 7, p. 375. July 1951.

A monograph is presented, the use of which makes an easy method of computing the depth of irrigation water being applied.

EFFECT OF NITROGEN ON YIELD AND QUALITY OF WHEAT.

By O. H. Lang and C. D. Sherbakoff; Agron. Jour., Vol. 43, No. 7, pp. 320-321. July 1951.

A 1-year study indicated that wheat yields as well as quality of wheat and flour are influenced by nitrogen, particularly when applications are made late in the development of the plant.

SOME EFFECTS OF 2,4-D FORMULATIONS IN HERBICIDAL CONCENTRATIONS ON WHEAT AND BARLEY.

By Alvin Overland and Lowell W. Rasmussen; Agron. Jour., Vol. 43, No. 7, pp. 321-324. July 1951.

Idaed spring wheat, Golden winter wheat, and Velvon barley were sprayed with three 2,4-D formulations - salt, amine, and ethal ester - to control annual weeds. These chemicals were applied at three rates - 1/2, 1, and 2 pounds of the acid equivalent per acre. Studies were made to determine the effect of the formulations at the three rates on the yield of these crops.

The annual weeds were readily killed with all three formulations at the 1- and 2-pound rates, but with the 1/2-pound rate the weeds died somewhat slower. Plots receiving the 1/2- and 1-pound rates did not show damage or decrease in yield, but the 2-pound rate resulted in morphological injury, or decreased yield, or both. The yield of barley was materially reduced with the application of 2-pounds per acre of the amine or ester. The yield data are also presented.

EFFECT OF SLASH MULCH AND SLASH BURN ON PINE AND SPRUCE PLANTINGS.

By Herbert A. Lunt; Conn. Agr. Exp. Sta. Bul. 548. April 1951.

The slash accumulation resulting from clean-up operations in parts of the Rainbow Plantation following the 1938 hurricane provided the opportunity to test out under Connecticut conditions the value of a slash mulch. At the same time data were obtained on the effect of burning scattered slash. The results are reported in this bulletin.

TOPSOIL AND PINE TREES IN ALABAMA'S PIEDMONT.

By James F. Goggans; Ala. Agr. Exp. Sta. Leaflet 31. May 1951.

It is now possible to estimate the early height growth that may be expected of slash and loblolly pine planted in Alabama's Piedmont. The depth of topsoil can be used to estimate the height growth that may be expected 8, 10, or 12 years after planting. This study again brings out the fact that the fastest growing pines are on the best soils.

STUDIES OF ORGANIC MATERIALS FOR VEGETABLE CROPS.

By L. M. Ware and W. A. Johnson; Ala. Agr. Exp. Sta. Bul. 280. June 1951.

Results are presented in this bulletin of studies with the use of organic materials on vegetable crops. The term "organic materials", as used in this publication, is applied to materials added to the soil either as green manure, as animal manure, or a mulching material.

The investigation included studies of the immediate and residual effects of organic materials grown on the land and turned under and of those introduced and incorporated in the soil or left on the surface as a mulch.

The value of organic materials was measured by effects on crop yields and on soil nitrates and soil moisture during the growth of crops, and by changes in the total nitrogen and organic matter content of the soil.

RESULTS OF LIME AND GYPSUM EXPERIMENTS WITH RUNNER PEANUTS.

By Franklin L. Davis and C. A. Brogden; Ala. Agr. Exp. Sta. Prog. Rpt. Series No. 48. May 1951.

Based on the results obtained in this study, it is probable that in Southeastern Alabama between 40 and 50 percent of the soils need more calcium and 75 to 90 percent of them need more potassium for best peanut yields. On many of the soils, a maximum response in yield to either lime or larger applications of potash is dependent upon supplying the other nutrient element.

A SUMMARY OF PHOSPHATE FERTILIZER EXPERIMENTS IN THE FIFTEEN WESTERN STATES.

By H. B. Peterson and J. L. Paschal; USDA, BPI, SAE and Agr. Exp. Stas. Research Rpt. No. 210. April 15, 1951.

A review has been made of the field investigations with phosphate fertilizers of fifteen Western states including Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. All published data were reviewed and consultations held with specialists from the 15 state agricultural experiment stations and extension service staffs, and the technical representatives of various industries. Data reviewed are up to and including 1949.

The original and primary purpose of this review was to determine the kinds and amounts of phosphate fertilizers that could be profitably used in the Western states. It soon became apparent, however, that the full realization of this objective was impossible. Gaps in research information and heterogeneity of the existing data

make quantitative estimates impractical. Nevertheless, considerable information on the phosphate needs of the West was obtained, along with valuable information on the status of various soils, placement, rates, residual carryover, effectiveness of various sources of phosphate, and the interrelationships of various other factors with phosphate application.

SPLASH EROSION.

By W. D. Ellison; Grain Quarterly, Vol. 9, No. 1, pp. 48-52. March 1951.

Controlling the splashing raindrop is the basic approach to soil conservation. Man has engaged in the struggle with soil erosion since he first started stripping the mantle of native vegetation from the surface of the earth. Despite this fact, however, man scarcely has advanced beyond the stage of mud conservation. This situation arises mainly through man's general failure to recognize the destructive effects of raindrops beating on the soil. For more than 5,000 years we have concentrated our research efforts on the erosion caused by runoff, while neglecting to develop a physical science for an attack on the problems of erosion by raindrops.

FERTILIZER AND LIME USED ON CROPS AND PASTURE, 1947.

By Donald B. Ibach and Robert E. Marx; USDA, BAE. Bul. FM-86. June 1951.

This is a report of a survey to obtain by objective farm-sampling methods, estimates of the acreages of different crops fertilized, qualities of plant nutrients used, and the distribution of this use among crops by farmers.

SOIL-FORMING INTERVALS ENDUCED IN THE KANSAS PLEISTOCENE.

By John C. Frye; Soil Sci., Vol. 71, No. 6, pp. 403-408. June 1951.

This paper discusses the intervals of optimum soil-forming conditions within each glacial-interglacial cycle, and presents graphically the stratigraphic relations of the major soil-forming intervals.

FORCE FIELDS AND CHEMICAL EQUILIBRIUM IN HETEROGENEOUS SYSTEMS WITH SPECIAL REFERENCE TO SOILS.

By Philip F. Low; Soil Sci., Vol. 71, No. 6, pp. 409-418. June 1951.

This paper discusses the effect of a force field on chemical equilibrium with special reference to the force field or fields existing at the surface of soil colloids, particularly the clay minerals.

A theoretical discussion is presented in which a general condition for equilibrium is derived in terms of a quantity called the "total potential".

The value of this quantity for a constituent of the system is shown to be the same in all phases of the system at equilibrium. In addition, at equilibrium the total potentials of reacting substances are shown to bear the same relationship to one another as do the reacting units of these substances.

Two kinds of activity are discussed; namely, the activity and the total activity. The relationship of the activity and the total activity to the chemical potential and the total potential respectively is presented.

The distinction between the chemical and total potential and between their corresponding activity functions is illustrated for the soil system. The difficulty of measuring the chemical potential and the activity in the soil system is pointed out.

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CALIBRATION OF FIBERGLAS SOIL MOISTURE UNITS.

By T. M. Hendrix and E. A. Colman; Soil Sci., Vol. 71, No. 6, pp. 419-427. June 1951.

This paper presents results recently obtained from the use of the fiberglas electrical soil-moisture instrument. There was no indication of drift in the calibration of fiberglas soil-moisture units after 15 months' exposure in field soil during which the soil underwent six drying periods.

Field and laboratory relations between soil-moisture content and soil-unit resistance do not agree when the laboratory calibration has been made in granulated soil, even when that soil has been repacked to field bulk density. Field and laboratory calibration are in good agreement when the laboratory calibration is made in a natural soil core which returns both field structure and field bulk density.

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INFLUENCE OF TOPOGRAPHY AND POSITION ON CLASSIFICATION OF SOILS HAVING IMPEDED DRAINAGE.

By J. C.F. Tedrow; Soil Sci., Vol. 71, No. 6, pp. 429-437. June 1951.

This study was undertaken to determine the importance of topography and position in the field classification of soils having impeded drainage.

A study of Croton soils showed that although profile morphologies were nearly identical within the series, wide moisture differences occurred under different topographic features.

When the soil occurred on sloping topography its behavior was similar to that of soil found in better drained areas. Sites with broad, level relief features near the beginning of watersheds had intermediate drainage. Sites at the bases of slopes were invariably rather wet and were saturated with water for long periods after rains. The pH values of the lower horizons in the low, flat phases were much higher than those in the sloping phases.

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AN X-RAY STUDY OF THE DECOMPOSITION OF KAOLONITE.

By R. D. Drogendorf, H. E. Kissinger, and A. T. Perkins; Soil Sci., Vol. 71, No. 6, pp. 439-448. June 1951.

This paper presents data which is helpful in understanding the possible conditions that might cause the conversion of one clay to another. From the data presented, it is evident that Kaolonite can be decomposed by grinding. It is assumed that grinding may simulate weathering the soil. Though the product of grinding kaolin has not been clearly identified, it is assumed that this product might reunite not only to reform kaolonite but also to form other mineral species that are desirable for an increase in soil fertility.

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INFLUENCE OF ORGANIC FERTILIZATION ON CERTAIN NUTRITIVE CONSTITUENTS OF CROPS.

By C. Stafford Brandt and Kenneth C. Beeson; Soil Sci., Vol. 71, No. 6, pp. 449-454. June 1951.

The problems incident to evaluation of the variations in over-all nutritional quality of a crop as influenced by some environmental factor such as fertilization are discussed. Limited data on the ascorbic acid, carotene, iron, and copper content of certain crops in relation to organic, vs. mineral fertilization are presented. No significant differences attributable to the source of plant nutrients were found.

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DEGREE OF CALCIUM SATURATION OF SOIL IN RELATION TO GROWTH AND CALCIUM CONTENT OF STRAWBERRY PLANTS.

By R. A. Lineberry and Leland Burkhardt; Soil Sci., Vol. 71, No. 6, pp. 455-466. June 1951.

The effect of degree of Ca saturation on the growth and Ca content of strawberry plants was investigated. Coxville fine sandy loam, representative of new land in a strawberry-growing area, was treated with CaCO_3 to give 2.5, 12.5, 25, 50 and 100 percent of theoretical Ca saturation. Two additional treatments consisted of CaSO_4 alone and a mixture of CaSO_4 and CaCO_3 . Part of the soil, having a cation-adsorption capacity of 22 me., was diluted with quartz sand to give a cation-adsorption capacity of 4 me. These soils were placed in terra-cotta cylinders plunged in the ground outdoors. Two plantings were made, one a week after the chemicals were applied, and the other 35 weeks later.

It was concluded that both the degree of Ca saturation and the total Ca in the soils are factors affecting the growth and Ca content of the strawberry plants.

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MANGANESE STATUS OF SOME NEW JERSEY SOILS.

By Stephen J. Toth; Soil Sci., Vol. 71, No. 6, pp. 467-472. June 1951.

The purpose of this study was to determine the Mn status of the most important agricultural soils in New Jersey, on the profile basis, and to obtain information on the Mn content of native and cultivated crops grown on these soils, to be used for further studies concerned with the Mn problem in the state.

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STUDIES IN GRAZING MANAGEMENT: I. A COMPARISON OF THE PRODUCTION OBTAINED FROM CLOSE-FOLDING AND ROTATIONAL GRAZING OF DAIRY COWS.

By W. Holmes, R. Waite, D. L. Fergusson and Jean I. Campbell; The Jour. of Agr. Sci., Vol. 40, No. 4, pp. 381-391. October 1950.

An experiment was carried out from May 3 to October 10, 1949 to compare close-folding with rotational grazing of dairy cows. With close-folding the cows were moved daily to an area of fresh pasture which was calculated to supply the day's feed requirements; the rate of stocking ranged from 50 to 80 cows per acre. With rotational grazing the cows were stocked on pasture at the rate of 6-8 cows per acre and moved from one pasture to another at intervals of 5 - 14 days. Two uniform groups of Ayrshire cows were used, and each group spent a period on each system of grazing. Two pastures, a ryegrass-dominant old pasture and a cocksfoot-dominant ley were used, and as far as possible the pasture grazed by both groups of cows was similar. The results are reported.

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STUDIES OF GRAZING MANAGEMENT: II. THE AMOUNT

AND CHEMICAL COMPOSITIONS OF HERBAGE EATEN BY DAIRY CATTLE UNDER CLOSE-FOLDING AND ROTATIONAL METHODS OF GRAZING.

By R. Waite, W. Holmes, Jean I. Campbell, and D. L. Fergusson; The Jour. of Agr. Sci., Vol. 40, No. 4, pp. 392-402. October 1950.

An attempt was made to measure the amount of herbage eaten by groups of milking Ayrshire cows when grazing under two different systems, (a) close-folding and (b) rotational. Under the close-folding the daily consumption of dry matter varied from 18 to 27 pounds per cow. Long herbage reduced the amount eaten. Considerable increases in the weight of herbage offered resulted in only slightly increased consumption. On good leafy pasture the dry-matter intake was about 24 pounds per cow per day.

Under the rotational system the intake was more constant at about 28 pounds dry matter per cow per day.

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IRON-MANGANESE INTERRELATIONSHIPS IN PLANT NUTRITION.

By G. J. Ouellette; Sci. Agr., Vol. 31, No. 7, pp. 277-285. July 1951.

The purpose of this study was to determine the effect of various iron and manganese concentrations and various ratios between these two elements in the substrate on the growth of plants. The work was done in the greenhouse, the substrate utilized was the Houghland-Berger nutrient solution, and the soybean was the indicator plant.

A concentration of 2.5 p.p.m. of manganese in the nutrient solution was toxic to plants when the iron concentration was low, and not toxic when the iron concentration was high. No iron toxicity was observed, even with 60 p.p.m. of this element in the nutrient solution. Manganese deficiency was brought about by increasing the iron concentration in the nutrient solution having low manganese concentrations.

The rate of uptake of manganese by soybeans was very nearly proportional to the supply of this element in the nutrient solution, whereas the rate of uptake of iron remained approximately constant when the concentration of this element in the tissue reached about 300 p.p.m.

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THE EFFECT OF CLIPPING FREQUENCY ON THE PRODUCTIVITY AND ROOT DEVELOPMENT OF RUSSIAN WILD RYE IN THE GREENHOUSE.

By R. Thaine and D. H. Heinrichs; Sci. Agr., Vol. 31, No. 7, pp. 316-322. October 1950.

A greenhouse study on the effect of clipping on yield, protein content, and root reserve was conducted with Russian wild rye. The total yield was progressively reduced with an increased number of clippings. The protein content of leaves was about two and one-half times as high when harvested at three-week intervals or less than when harvested at the hay stage. The total protein yield of the leaves harvested at three-week intervals was from 60 to 100 percent higher than of leaves harvested at any other frequency. The more often the grass was clipped, the less the amount of root reserve per given weight of root.

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JUSTIFICATIONS FOR FOREST PRUNING IN THE NORTH-EAST.

By David B. Cook; Jour. Forestry, Vol. 49, No. 7, pp. 487-489. July 1951.

To foresters, pruning represents a method of speeding up the development of that smooth, cylindrical bole which is the ideal of timber tree form. Generally, it has been applied only to those stems destined to grow to large size for saw logs. But, as management becomes more intensive, this may prove to be too limited an objective. There are many sound reasons - pathological and administrative as well as economic - why we should prune. But because pruning represents a heavy outlay of capital that cannot be recaptured for a considerable time, it must be carefully planned and skillfully executed, lest we commit ourselves to an unprofitable venture.

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CONVERTING MATURE NORTHERN HARDWOOD STANDS TO SUSTAINED YIELD.

By W. M. Zillgitt; Jour. Forestry, Vol. 49, No. 7, pp. 494-497. July 1951.

This paper discusses the joint role of economics and silviculture in converting mature hardwood stands to sustained yields in the lake States.

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NEW TRENDS IN CONTROL OF NOXIOUS RANGE PLANTS.

By C. Kenneth Pearse; Jour. Forestry, Vol. 49, No. 7, pp. 498-500. July 1951.

This paper reviews the battle to eliminate noxious range plants and points up present trends in that battle.

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WATERSHED MANAGEMENT AND FLOOD CONTROL SURVEYS.

By H. G. Wilm; Jour. Forestry, Vol. 49, No. 7, pp. 511-513. July 1951.

This paper reviews the background and present progress of flood-control surveys and action programs; suggests where they may be fitted into a broader program of watershed management; and comments briefly on recent activities in planning the multiple resource development of large drainage basins, with flood control as one aspect.

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AN ECONOMICAL METHOD OF MARKING TIMBER.

By W. S. Bromely; Jour. Forestry, Vol. 49, No. 7, pp. 478-519. July 1951.

This paper describes a method for use in developing a procedure for keeping records of the timber marking operation which provides for a very practical and sensible control of the activity.

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THE HALOGETON PROBLEM ON UTAH'S RANGES.

By L. A. Stoddart, Howard Clegg, Ben S. Markham, and George Stewart; Jour. Range Mgt., Vol. 4, No. 4, pp. 223-227. July 1951.

This paper outlines the Halogeton problem in Utah. It is concluded that Halogeton will never be eliminated from the intermountain deserts and the solution of the problem is good management of ranges and livestock. Burning, scraping, spraying and other control measures are likely to increase rather than decrease Halogeton and should be attempted only after scientific study of each specific case by a capable ecologist. The Halogeton problem is a serious one but there is no foundation for fear that the western livestock business faces destruction. Good management will enable stockmen to combat this problem without insurmountable losses.

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ELECTRIC FENCE FOR DISTRIBUTION OF CATTLE ON A RANGE GRAZED BY SHEEP AND CATTLE.

By Arthur D. Miles; Jour. Range Mgt., Vol. 4, No. 4, pp. 228-239. July 1951.

This paper presents results obtained from the use of an electric fence which was installed on a ranch in 1943. The charged one-wire fence has been adapted to the range as a permanent improvement, and 40 miles of it has been built. The fence has done the job of holding cattle through the vicissitudes of eight years. It has held mature cattle, and it holds calves. Better utilization of the range, with improved plant vigor and better cover, has become possible with the multiple use of sheep and cattle. The electric fence has made this multiple use economically feasible.

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UTILIZATION OF WINTER RANGE FORAGE BY SHEEP.

By Lisle R. Green, Lee A. Sharp, C. Wayne Cook, and Lorin E. Harris; Jour. Range Mgt., Vol. 4, No. 4, pp. 233-241. July 1951.

This study was conducted to determine which forage plants were eaten, factors which affect the selection, amount consumed daily, and factors which limit consumption. The results for the period 1946 to 1948 are reported.

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EFFECTS OF RANGE CONDITION ON LIVESTOCK PRODUCTION.

By J. S. McCorkle and Arnold Heenwagen; Jour. Range Mgt., Vol. 4, No. 4, pp. 242-248. July 1951.

This paper is a progress report on a survey to determine the influence of range condition on livestock production. Ranches averaging good condition marketed an average of 14.3 pounds of cattle per acre. Ranches averaging fair condition marketed 11.2 pounds of cattle per acre. Ranches averaging poor condition marketed an average of 8.9 pounds of cattle per acre.

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STATUS OF BROUSE ON RANGES OF EASTERN OREGON AND EASTERN WASHINGTON.

By Glenn E. Mitchell; Jour. Range Mgt., Vol. 4, No. 4, pp. 249-253. July 1951.

This paper discusses the brouse conditions in eastern Washington and eastern Oregon.

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VEGETATIONAL CHANGES ON A 25-YEAR SUBSERE IN THE LOESS HILL REGION OF CENTRAL NEBRASKA.

By John W. Voigt; Jour. Range Mgt., Vol. 4, No. 4, pp. 254-263. July 1951.

Subseres are caused mostly by biological activity. A common cause of subseres in grasslands is plowing for cultivation, subsequent erosion and abandonment.

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EFFECT OF FIRE ON A MIXED GRASS-SHRUB RANGE IN SOUTHERN ARIZONA.

By R.R. Humphrey and A. C. Everson; Jour. Range Mgt., Vol. 4, No. 4, pp. 264-266. July 1951.

This study was made to determine the effect of burning on certain shrubs and grasses on a mixed grass-shrub range near Tucson, Arizona. The results are reported.

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USE OF AERIAL PHOTOGRAPHS AND SUB-SAMPLING IN RANGE INVENTORIES.

By Robert W. Harris; Jour. Range Mgt., Vol. 4, No. 4, pp. 270-278. July 1951.

This paper describes the application of a sampling procedure to range inventories, employing aerial photographs and sub-sampling.

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DOES POTASH FERTILIZER REDUCE PROTEIN CONTENT OF ALFALFA?

By Arthur Wallace; Better Crops with Plant Food; Vol. 35, No. 6, pp. 20-22, 38-41. June-July 1951.

This paper presents the major findings of a study conducted over a 10-year period to determine potassium-calcium-carbohydrate-protein relationships in alfalfa and the reasons for them. It was concluded that potassium did not decrease the protein content of alfalfa but might decrease the calcium content.

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NEGLECTED PLANT-FOOD ELEMENTS.

By Benjamin Wolf; Better Crops with Plant Food, Vol. 35, No. 6, pp. 9-16, and 36-37. June-July 1951.

Shortages of certain neglected elements have become increasingly more numerous. Such deficiencies have not occurred everywhere and in many areas deficiencies are unknown. However, light soils of the coastal plain and the muck soils have shown need of one or more of the trace elements. Deficiencies of the various trace elements are described. The necessary elements can be added directly to the soil, mixed with fertilizer, or applied as dusts or sprays directly to plants.

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METHODS OF TILLAGE FOR WINTER WHEAT AT ARCHER FIELD STATION.

By A. L. Nelson; Wyo. Agr. Exp. Sta. Bul. 300. August 1950.

Storage of soil moisture and prevention of soil blowing are vital factors in successful production of winter wheat. Field trash intermingled with a cloddy mulch furnishes the best condition for reception and retention of soil moisture. It also furnishes the best condition for preventing wind and water erosion. Medium-shallow tillage with the eccentric one-way disk has proved more productive than any other method of tillage.

Under the alternate fallow and cropping method

of production the soil lost 33 percent of its nitrogen over a period of 35 years, and under continuous cropping and plowing it lost 26 percent. Results indicate that the less the soil is stirred, the less the loss of nitrogen. Rotation of crops and green manure have not materially reduced the loss of nitrogen. Application of barnyard manure is the only method which has greatly reduced nitrogen losses from the soil.

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HOW TO USE 2,4-D.

By Dale W. Bohmont; Wyo. Agr. Exp. Sta. Cir. 34, July 1948.

It is the responsibility of every person who works with 2,4-D whether he is the commercial representative or the spray rig operator, to have a thorough understanding of how to mix the formulation he has and how it should be applied. With this in mind formulas and suggestions on calibration, mixing, and application of 2,4-D are presented.

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RANGE-CONDITION CLASSES ON THE LARAMINE PLAINS, WYOMING.

By Alan A. Beetle; Wyo. Agr. Exp. Sta. Cir. 37. April 1950.

Range condition is the relative productivity of both soil and forage of a given range in terms of what it would be under the best possible management. This circular deals mainly with vegetation classes.

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ECONOMICS OF GRAIN FARMING IN RENVILLE COUNTY NORTH DAKOTA.

By L. W. Schaffner; N. D. Agr. Exp. Sta. Bul. 367. May 1951.

This study gives an intimate view of the farmer's present economic position in one of the largest proposed new irrigation areas in the Missouri Basin. Many of the findings are applicable far beyond the boundaries of Renville county, as they portray typical farm sizes, types of farming, practices, capital requirements, cost and income experiences common to extensive grain farming in north central and northwestern North Dakota.

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SATISFACTORY RANGE RE-SEEDING PROVES NO EASY JOB.

By J. C. Ebersole; Sheep & Goat Raiser, Vol. 31, No. 11, pp. 16-17 and 40-41. August 1951.

Reseeding rangeland is one of the important practices in range conservation. There is little doubt as to the value of using this practice in those areas in which it can be done with a reasonable chance of success. However, it is no cure-all, and invariably it should be carried on with other good range conservation practices.

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IRRIGATION EXPERIMENTS ON 1950 CORN.

By Stephen J. Mech; Wash. Agr. Exp. Sta. Prog. Rpt. April 1951.

This report covers the results from the 1950 irrigation experiments on corn. It includes also a limited amount of pertinent data from previous experimentation. It follows a similar report in 1949 on sugar beet experiments.

A number of conclusions have been drawn and are presented. However, the basic data are presented in considerable detail so that the reader may not only have the opportunity to test the validity of these conclusions, but quite probably may find information other than that specifically pointed out in the text.

The corn experiments were conducted on the same plots and in the same general way since 1944. Corn followed last year's sugar beets and thus brought to an end the "soil depleting" phase of the 7-year rotation of wheat-alfalfa, alfalfa, alfalfa, alfalfa, potatoes, sugar beets and corn. In 1951 wheat followed by a seeding of alfalfa will provide information on the last step of this 7-year cycle.

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ACID-BASE-COMBINING CAPACITIES OF CONCENTRATED BACTERIAL SUSPENSIONS.

By John O. Harris and T. M. McCalla; Jour. of Bacteriology, Vol. 61, No. 1, pp. 57-62. Jan. 1951.

This investigation was undertaken to compare the acid-base-combining capacities of different species of bacteria and to study the mechanism of the buffering action.

The acid-base-combining capacities of dense cell suspensions of 13 common bacterial species are given. Some quantitative differences were found among the various species. Adsorption and desorption of hydrogen ions were demonstrated. Repeated attempts failed to remove the combined alkali by replacement experiments. It is suggested that the alkali may react with the cells, causing hydrolysis of nucleic acids and protein components of the outer layers of the cells.

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HOW TO GROW BETTER PLANTS.

By J. B. Preston; What's New in Crops and Soils, Vol. 3, No. 9, pp. 9-12. Aug-Sept. 1951.

This article outlines the procedure followed by a farmer who produced 2,540 pounds of peanuts per acre in 1950.

WINTER GRAINS LENGTHEN YOUR PASTURE SEASON.

By M. A. Sprague; What's New in Crops and Soils, Vol. 3, No. 9, pp. 18-21. Aug-Sept. 1951.

This article explains how grazing capacity can be increased by fitting short lived plants, such as winter small grains, into crop rotations to supplement permanent pastures and thereby increase the number of grazing days in each year.

WIND EROSION FIELD STUDIES YIELD MORE FACTS.

By Elbert B. Macy; What's New in Crops and Soils, Vol. 3, No. 9, pp. 22-24. Aug-Sept. 1951.

This paper discusses field tests made by a wind tunnel during 1949 and 1950.

SUMMARY OF RECORDS FROM 120 FARMS IN THE SLOWLY PERMEABLE SOILS AREA OF NORTHEASTERN ILLINOIS, 1950.

By W. H. Heneberry, E. L. Sauer, and H. C. M. Case; Ill. Agr. Exp. Sta. AE-2808. June 28, 1951.

Differences in income between high- and low-conservation farms in 1950 were especially noticeable on mixed soils and on Clarence-Rowe soils. On Clarence-Rowe soils the high-conservation farms netted nearly one-third more income per acre than the low-conservation farms. This higher income is enabling the farmers to build up their land still further as well as providing a better standard of living for the family. Low-conservation farmers, on the other hand, are steadily lowering the productivity of their soil.

CLIMATES PREVAILING IN THE YELLOW-GRAY EARTH AND YELLOW-BROWN EARTH ZONES IN NEW ZEALAND.

By F. B. Hurst; Soil Sci., Vol. 72, No. 1, pp. 1-19. July 1951.

This paper discusses methods of evaluating climate in relation to the formation of yellow-gray and yellow-brown earth zones and shows how they

can be applied to the problem.

A SOIL AERATION THEORY BASED ON DIFFUSION.

By C. H. M. van Bavel; Soil Sci., Vol. 72, No. 1, pp. 33-46. July 1951.

On the assumption that the principal mechanism of soil aeration is gaseous diffusion, it is shown how, using elementary diffusion theory expressions may be obtained that give the partial pressure of a soil gas at any depth through solution of a Poisson equation in one dimension.

THE MICRONUTRIENT CATIONS IRON, MANGANESE, ZINC, AND COPPER: THEIR UPTAKE BY PLANTS FROM THE ADSORBED STATE.

By Emanuel Epstein and Perry R. Stout; Soil Sci. Vol. 72, No. 1, pp. 47-65. July 1951.

A technique is described for studies of the uptake by plants of the micronutrient cations adsorbed on soil cation-exchange materials at low concentrations. Bentonite was the adsorption medium in the experiments reported. Radioactive isotopes of iron, manganese and zinc were used as tracers.

A STUDY OF THE INFERTILITY OF TWO ACID SOILS.

By J. M. Heslep; Soil Sci., Vol. 72, No. 1, pp. 67-80. July 1951.

The results of this investigation show that the primary cause of the poor growth of Romaine lettuce in the two acid California soils is a severe phosphorus deficiency, which is accompanied by an extremely high phosphate-fixing capacity of the soils. After the phosphorus deficiency is corrected, further substantial growth increases can be obtained by partly neutralizing soil acidity with either $\text{Ca}(\text{OH})_2$ or MgO .

It is shown that the growth increments obtained by addition of these bases is not the result of furnishing needed nutrient Ca and Mg.

It is further indicated that the relatively poorer growth of Romaine lettuce in the acid soils to which no $\text{Ca}(\text{OH})_2$ or MgO was added is not directly attributable to toxicity of manganese or aluminum.

A DOZEN YEARS OF CONSERVATION FARMING.

By H. O. Anderson and P. E. McNall. Wis. Agr. Ext. Service Cir. 401. June 1951.

This circular tells the experiences of a Grant County, Illinois farmer who started farming the conservation way in 1938. When figured at 1945 price levels, net incomes for the farmer were \$900 higher in the last four-year period than the average for 1933-36.

Russian knapweed, and 4 weeks for white top and dogbane. The longest effective intervals between duckfoot cultivations, from 3 to 5 inches deep, were about 3 weeks for bindweed and 4 weeks for Johnson grass.

THE EFFECT OF PHYSICAL PROPERTIES OF SOIL ON THE EFFICIENT USE OF FERTILIZERS.

By L. D. Baver; Agron. Jour., Vol. 43, No. 8, pp. 359-363. Aug. 1951.

Physical properties of soils affect the efficient utilization of fertilizers in at least three ways; restricting root development, impairing normal adsorption by established roots, and impeding microbial activity. The use of commercial fertilizer must go hand in hand with the improvement of soil structure if maximum returns are expected.

MOVEMENT AND ACCUMULATION OF WATER-SOLUBLE BORON WITHIN THE SOIL PROFILE.

By Clarence M. Wilson, Roy L. Lovvorn, and W.W. Woodhouse, Jr.; Agron. Jour. Vol. 43, No. 8, pp. 363-367. Aug. 1951.

The movement of boron in soils is influenced by soil texture. Forty pounds of borox per acre was almost completely lost from the surface 8 inches of Norfolk sandy loam within a period of 6 months. At the same time most of the recoverable, water-soluble boron in Cecil clay was found in the upper 8-inch layer of soil.

Soil samples from old alfalfa stands on Norfolk and Cecil soils, where approximately 30 pounds of borox had been applied annually for 6 years, showed most of the water-soluble boron in the Norfolk sandy loam to be accumulated in the 12- to 36-inch layer of soil.

FREQUENCY AND DEPTH OF SHOOT-CUTTING IN ERADICATION OF CERTAIN CREEPING PERENNIAL WEEDS.

By F. L. Timmons and V. F. Burns; Agron. Jour., Vol. 43, No. 8, pp. 371-375. August 1951.

One or more frequency of shoot-cutting experiments were conducted on field bindweed, white top, Russian knapweed, dogbane, Johnson grass, and climbing milkweed. Depth of shoot-cutting of bindweed, dogbane, and Russian knapweed was investigated.

The longest intervals between shallow hoeings, which were effective in eradicating the various weeds, were 2 weeks for bindweed, 3 weeks for

THE RELATIONSHIP OF RAINFALL AND OTHER CLIMATIC FACTORS TO CROP PRODUCTION IN THE CENTRAL GREAT PLAINS.

By A. F. Swanson; Agron. Jour., Vol. 43, No. 8, pp. 397-400. Aug. 1951.

The distribution of precipitation, range of temperatures and other climatic factors presented by graphs by 5-day intervals for the 28-year period 1921-1948 at Hays, Kansas. The graphs reveal a weather pattern for the area. The graphs have been found useful in planning a cropping system and an aid in the development of varieties whose critical fruiting period and maturity tend to occur when rainfall and other climatic factors are likely to be the most favorable for crop production. The knowledge of a weather pattern for an area is helpful in interpreting the reason for poor crop performance, or why a crop responded favorably to the climatic factors.

APPLICATION OF THE MULTIPLE-USE DRILL.

By J. Nick Jones, Jr., J. H. Lillard, and R.C. Hines, Jr.; Agr. Eng., Vol. 32, No. 8, pp. 417-419. Aug. 1951.

The problems of producing small grains and supplemental pastures by mulching procedures have been under investigation the past four years. The results indicate that problems of germination, vegetative growth, and fertilization requirements similar to those encountered in the application of mulch principles in the production of corn are evident. All of these factors are so greatly affected by climatic conditions that consistent results with the same treatments have not been obtained throughout the experiment.

It appears that the experimental multiple-use drill used in these tests embodies the essential mechanical features necessary to minimize the above problems.

SUBSOIL CONDITIONING OF CLAY PANS FOR WATER CONSERVATION.

By Dwight D. Smith; Agr. Eng., Vol. 32, No. 8, pp. 427-429. August 1951.

Subsoiling may be expected to produce moderate increases in crop yields on claypan soils as the

putnam. The important requirements are (a) subsoiling when the subsoil has been dehydrated such that it will shatter, and (b) a deep treatment of lime in the range of 3 to 5 tons per acre. Soybeans have been more responsive to the treatment than other grain crops.

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MEASURING WATER-APPLICATION EFFICIENCY OF IRRIGATIONS.

By D. K. Fuhrman; Agr. Eng., Vol. 32, No. 8, pp. 430-433 and 454. August 1951.

This report presents data which indicate that in many cases under actual field measurements of water application efficiencies, the amount of water consumed by the crop in the time interval between samples is not negligible and may have a great effect upon the computed efficiency.

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RAIN-MAKING.

By Arthur H. Cashart; The Land, Vol. 10, No. 2, pp. 142-148. Summer 1951.

This paper describes the procedure of seeding clouds with silver iodide crystals for assisting natural forces in producing more rain. Several instances are cited where the method of cloud seeding was practiced; and problems raised by such procedure are pointed out.

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FOREST PLANTATIONS IN ARKANSAS.

By Fayette M. Meade; Ark. Agr. Exp. Sta. Bul. 512. June 1951.

This report deals with two phases of forest planting in Arkansas. The first part is concerned with the Arkansas Ozark area. It covers results of a field survey of commercial plantations in the Arkansas Ozarks. The discussion of results obtained with individual species also includes data from plantations established by the Ozark stations of the Arkansas Agricultural Experiment Station. The second part reports on experimental plantings made at the Fruit and Truck Branch Station in southwestern Arkansas. No survey of commercial plantations was made in south Arkansas.

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SOIL IMPROVEMENT PRACTICES AFFECTING YIELDS OF COTTON.

By R. P. Bartholomew; Ark. Agr. Exp. Sta. Bul. 513. June 1951.

Large yields of cotton, or of any other crop, can only be maintained through proper soil management practices. These practices include the use of crop rotation, of winter cover crops, of legumes for soil improvement, and of fertilizers adapted to the particular soil condition. In addition, the supply of available soil moisture is an important factor.

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CHARACTERISTICS OF IRRIGATION WATERS IN IDAHO.

By Max C. Jensen, Glenn C. Lewis and G. Orien Baker; Idaho Agr. Exp. Sta. Research Bul. No. 19. February 1951.

This study was conducted to determine the composition of the principal irrigation chemical make-up. The findings are reported in this bulletin.

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REPORT TO THE PEOPLE OF WISCONSIN ON THE STATE'S RENEWABLE NATURAL RESOURCES AND 1949 CONSERVATION EFFORT.

By Ernest F. Swift; Wis. Conservation Bulletin. February 1950.

This is a summary of the activities of conservation-related agencies in the state along with a statement of the status of major resources and problems needing solution.

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FERTILIZATION OF RED McCLURE POTATOES IN THE SAN LUIS VALLEY OF COLORADO.

By R. Kunkel, R. Gardner, and A. M. Binkley; Colo. Agr. Exp. Sta. Tech. Bul. 43. January 1951.

This is a report of the results of a 4-year study of the use of fertilizers and minor elements in the San Luis Valley. The effects on yield, grade, specific gravity, and keeping quality are reported.

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DEPLETION OF HIGH PLAINS WHEATLANDS.

By H. H. Finnell; USDA Cir. No. 871. June 1951.

Depletion of High Plains wheatlands began with the first breaking of the sod. Abandonment due to erosion damage has been taking place at a rapid rate on low-capability lands. On the most severely damaged lands not yet abandoned, the level of production has fallen an average of 7 bushels per acre in 27 years. Soil erosion was responsible for 4.2 bushels of the loss. Crop removals which were not offset through fertilizer application and the planting of legumes were

responsible for 2.8 bushels of the loss. The erosion removals of the rich topsoil brought about lower crop yields four to five times as fast as later similar removals of subsurface and subsoil material.

Eighty-nine percent of the soil loss from the nearly flat wheatlands of less than 2-percent slope in the southern High Plains was due to wind action, 11 percent to water action.

All cultivated lands in areas of 14 to 28 inches of rainfall should be protected through the application of suitable wind-erosion-control measures. In addition, all slopes of 2 percent or more should be terraced and contour-farmed from the time they are first put in cultivation.

All precautions against erosion which tend to increase moisture-using efficiency should be redoubled when the loss of vegetative cover is threatened by drought. The conservation of crop residues never ceases to be important regardless of whether it is done to protect the surface soil from wind and water erosion, to increase the infiltration of water, or to maintain the supply of organic matter in the soil.

In selecting lands for wheat raising it is advisable, whatever the longtime rainfall conditions may be, to choose only high-capability land for cultivation, and then to consistently prevent both wind and water erosion throughout the cultivated life of the fields. It is when the fertility ceiling becomes the chief limiting factor of production, as during seasons of plentiful moisture supply, that such measures prove their worth in high yields.

PROBLEMS ENCOUNTERED BY FARMERS IN APPLYING SOIL CONSERVATION PRACTICES IN OHIO.

By R. H. Blosser; Ohio Agr. Exp. Sta. Mimeo. Bul. No. 227. August 1951.

This report discusses some of the obstacles that delay farmers in adopting recommended soil and water conservation practices in Ohio. Data for this study were obtained from personal interviews with more than 400 farmers in Coshocton, Morrow, Fayette and Champaign Counties. Approximately 350 of the farmers had conservation plans that had been developed in cooperation with the local soil conservation districts.

Some of the obstacles discussed in this report apply to the establishment of other new farm practices as well as conservation farming. Until these obstacles are overcome in the general field of agriculture, they will continue to hinder some farmers from adopting recommended conservation practices on their farms.

Some of the initial difficulties connected with

conservation farming will disappear after the program has been adopted. These difficulties exist only during the transition period from the present to the proposed methods of farming. Some difficulties may continue after the conservation program is established because they are associated with the maintenance of the recommended practices.

Two types of obstacles that delayed the adoption of conservation practices were discussed in this report. One type included the obstacles connected with the direct application of conservation measures. The other type included the obstacles associated with the harvesting and utilization of more hay and pasture.

Some of the obstacles discussed are real while others may be imaginary. The former type may be largely overcome by research, the latter type by education.

SOIL AND WATER CONSERVATION STUDIES.

By R. B. Hickok; Ind. Agr. Exp. Sta. Annual Rpt. Ditto. 1950.

This report includes watershed studies, water control on muck soils and crop residue management and mulch tillage.

A METHOD FOR EVALUATING BORDER IRRIGATION LAYOUTS.

By Wayne D. Criddle and Sterling Davis; USDA, SCS. Multi. Bul. March 1951.

This report describes a technique for gathering information at a particular site for use in laying out a satisfactory border irrigation system and for determining the proper streams of water to use. Soil Conservation Service technicians and others charged with assisting farmers in farm irrigation system lay-outs may find the method described useful.

SOIL FERTILITY AND PROPER FERTILIZATION AS MAJOR FACTORS IN ECONOMICAL COTTON PRODUCTION.

By Claude L. Welch and Leonard Lett; Fertilizer Review, Vol. 25, No. 1, pp. 7-10. January-February-March 1950.

Reducing costs and increasing the yield per acre in cotton production are complementary and play a major part in cotton's fight to maintain its place in the textile world. Many possibilities now exist in this field. With continued improvements in methods and in development of adaptable and economical machinery, it appears that

greater opportunities will be open for the producer to reduce his production costs.

Mechanization of cotton production is increasing in all areas of the Cotton Belt. Better and more adaptable equipment is being developed for all of these different areas. In certain sections such as the Mississippi Delta, the High Plains area of Texas, and the irrigated areas in the Far West which lend themselves to mechanization, labor requirements have been reduced as much as 90 percent when all phases of production are mechanized.

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THE FUTURE BECKONS - GREATER GRASSLANDS.

By John F. Gale; Fertilizer Review, Vol. 26, No. 3, pp. 3-5. July-August-September 1951.

A good stand of grass or hay is the least expensive source of feed on the farm. A well managed grassland program will return a handsome profit in beef, milk, mutton, wool, pork, poultry, eggs and when plowed under, fertility for the next crop in the rotation.

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GASSING THE GOPHERS.

By Hu Blonk; The Reclamation Era, Vol. 37, No. 9, pp. 194-196. September 1951.

This article explains how gophers can be controlled on canal banks by the use of gas.

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SHORT CUTS TO WEED KILLING CALCULATIONS: PART 4 - HOW TO CALIBRATE YOUR SPRAY RIG.

By John T. Maletic; The Reclamation Era, Vol. 37, No. 9, pp. 206-207. September 1951.

This article outlines the procedure necessary to calibrating a spray rig so that it will apply spray at the desired rate per acre.

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SOME FUNDAMENTAL PLANT-SOIL-WATER RELATIONS IN WATERSHED MANAGEMENT.

By Leon Lassen, Howard W. Lull, and Bernard Frank; USDA Forest Service, Multi. July 1951.

This paper describes some of the physical and biological aspects of plant-soil-water relationships problems in their relation to watershed management when applied to drainage basins.

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AIRPLANE SPRAYING FOR FOREST PEST CONTROL.

By J.S. Yuill, C. B. Eaton and D. A. Isler. USDA ARA-BEPQ, E-823. August 1951.

This article summarizes current information on the use of airplanes in spraying forests for insect control.

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INFLUENCE OF DRYING ON SOIL BUFFERING IN RELATION TO AGGREGATION AND OTHER FACTORS.

By R. M. Smith and D.R. Browning; Jour. of Agr. Research, Vol. 78, No. 9, pp. 267-284. Washington, D. C. May 1, 1949.

The object of this paper is to report data obtained from drying soils before determining the pH, especially in connection with measurements of buffering capacity; and to attempt to show how the influence of drying may help to clarify some of the indicated interrelations of pH, buffering base exchange, and exchange capacity.

pH determinations of many varied samples show that oven drying definitely increases the acidity as compared to that of moist or air-dried materials. The effect is most pronounced when freshly added bases are involved but is also evident in soils leached free of bases. An increase buffering results from the greater effect with added bases. Alternate soaking and drying has little more effect than a single drying. The reversibility of the effect of drying with fresh bases is very slow and probably never complete, at least with some soils. When no new bases are added the pH usually returns to the original value in 30 days or less.

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SUMMARY OF THE 1950 GRAZING AND FEEDING WORK AT THE BLACKLAND EXPERIMENT STATION.

By O. J. Tippit, J. H. Jones and J. R. Johnston; Tex. Agr. Exp.Sta. Prog. Rpt. 1333. March 5, 1951.

Cotton is the major crop in the agriculture of the Blacklands. Continuing work at the Temple station indicates that beef may become the second most valuable product, with the marketing of grain and forage through cattle. Progress in some of the factors involved in the production of beef in the Blackland Prairies is given in this report.

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EXPERIMENTAL CONTROL OF POISONOUS RANGE PLANTS IN TEXAS.

By Omer E. Sperry; Texas Agr. Exp. Sta. Prog. Rpt. 1334. March 5, 1951.

Herbicidal control of poisonous range plants is

effective and practical as a good range management practice. When applied to large acreages, the cost, depending on herbicide and concentrations used, runs from around \$2.00 to about \$4.00 per acre. Lighter stocking, deferment of poor-condition ranges and the isolation of hazardous sites should be practiced along with herbicidal control if lasting benefits are to be realized.

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EFFECT OF SULPHUR, NITROGEN AND PHOSPHORUS AMENDMENTS ON COTTON PRODUCTION AT THE BLACKLAND STATION, 1950.

By E. N. Stiver, R. J. Hervey, H. E. Hampton and J. R. Johnston; Tex. Agr. Exp. Sta. Prog. Rpt. 1336. March 6, 1951.

The 1950 results indicate that no single increment of fertilizer, or combination of nitrogen, phosphorus or sulphur, increased cotton yields following one year of fertilized oats-Madrid sweetclover.

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CHEMICAL CONTROL OF WEEDS IN CONVERTING PASTURE LAND TO TOMATO PRODUCTION IN EAST TEXAS.

By P. A. Young; Texas Agr. Exp. Sta. Prog. Rpt. 1338. March 8, 1951.

In preparing pasture land for tomato production in a grassland-tomato rotation in East Texas, chemicals were used to good advantage in controlling several species of noxious perennial plants.

Thoroughly soaking freshly cut stumps with a solution of two pounds of Ammate per gallon of water killed 75 to 90 percent of the persimmon and sassafras sprouts and nearly all the sweet gum and bear grass plants treated.

A 0.1 percent 2,4-D solution, used as a foliage spray, was effective in controlling bull nettles and rosin weeds. The 0.1 percent solution was more effective than the 0.2 percent solution.

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IRRIGATED AGRICULTURE IN TEXAS.

By William F. Hughes and Joe R. Motheral; Tex. Agr. Exp. Sta. Misc. Pub. 59. September 1950.

The expansion of irrigation during the war and postwar years advanced irrigation farming to a significant place in Texas agriculture. During the 9-year period, 1940-48, the area under irrigation expanded from 1,045,000 to 2,885,000 acres. In the latter year, nearly 30,000 Texas farms were partly or wholly dependent for their production upon water supplies obtained either

from surface or underground sources.

Approximately 10 percent of the State's total acreage of principal crops harvested in 1948 was from irrigated land. What is more significant, crops from irrigated land accounted for nearly 30 percent of the total farm value of all principal crops grown in Texas.

Most of the expansion in irrigated land resulted from individual developments of ground-water resources. These developments account for 1,369,000 acres, almost three-fourths of the 9-year increase, as compared with an increase of 463,000 acres in developments utilizing surface-water supplies.

Except for the decennial Censuses of Irrigation, no comprehensive survey of irrigation has been conducted since 1914. This publication, which presents a compilation of statewide data, is intended to serve as a source of basic information on this increasingly important subject.

Presented herein is a review of the existing situation and its contributing factors. The several possibilities for additional development and the possible consequences arising from the present extent of development are not treated.

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